A window open on the world

The UNESCO Courier

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monuments in peril

UNESCO ARCHIVES

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Monuments of stone are often victims of diseases that cause them to corrode and decay. Here the features of a statue of the Virgin, in the Abbey of St. Ghislain, Belgium, are slowly being effaced by one of these maladies (see page 26).

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COVER PHOTO

Tree roots spread like giant tentacles over a sculptured stone head as jungle vegetation invades the temples of Angkor in Cambodia. Today this magnificent ensemble of monuments is being restored and also protected from many ills that threatened to destroy it completely (see page 28).

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MONUMENTS IN PERIL

A WORLD CAMPAIGN TO PROTECT OUR CULTURAL HERITAGE

Our December 1964 issue reviewed the results of the International Campaign to Save the Monuments of Nubia. The present number is devoted to the International Campaign for Monuments which Unesco launched last June. The campaign's purpose is to foster greater public and official awareness of the need to safeguard our monuments and cultural treasures of the past from the neglect and ravages of time which often endanger them. Where these monuments are in peril, Unesco's member states have been called upon to take direct action for their protection. It is hoped that this issue will help to focus attention and interest on this important cultural problem facing many countries today.

Carcassonne in Southwest France appears today exactly as it did in medieval times, thanks to a remarkable feat of restoration in the 19th century which has saved it for posterity. The ramparts were themselves built on the ruins of earlier walls raised by the Romans and Visigoths.

© Paul Almasy, Paris

ONE of man's distinctive features is his habit of leaving behind on the soil from which he wrests his livelihood all sorts of remains which provide a record of his history. As the centuries go by, most of them are reduced to ruins, to piles of stone or brick, sometimes even to a mere succession of layers like the layers of sediment at the bottom of the sea.

Digging into the earth, we come across these remnants of ancient civilizations—a blackened area with its reminder of a fire, a layer of silt that means a flood has passed that way, or the traces of far-reaching geological events alternating with layers in which the vestiges of vanished cultures appear.

But from age to age, man reconstructs in order to meet new needs. He may again use the old stones, grind marble to dust and make lime of it, demolishing what he regards as useless and rebuilding on the same foundations. When a city is no longer in keeping with the political structure of a people or drops in status through a monarch's whim, or war or pestilence have taken their toll, its fate is neglect and, unless newcomers unwittingly camp in its ruins, no one cares any more about its origins or its history. That has happened for thousands of years.

Nevertheless, some special buildings and places such as sacred precincts, temples and the tombs of the mighty, were designed to last forever and were generally respected by those who came after; and certain public constructions, such as fortifications, could endure for centuries without losing their utility. In any case, man instinctively built, if not for eternity, at least for his descendants. Knowing how brief his own span of life was, he speculated on the continuity of his institutions. With great labour and expense, a community would erect the palace of a reigning dynasty, a city hall, a market, a theatre or a place for games. In the course of time, a new religion might appropriate the temples of its predecessor, a republic might take over the residence of a fallen prince. But when piety grew faint, the heroes were forgotten or the prince took up residence elsewhere, then the public buildings were abandoned.

Then, again, wars were as fatal as revolutions to these constructions that came to be associated with a hostile authority. From time immemorial, the enemies of a religion have sacked its holy places, rebels have turned their fury on all that glorified the rulers, and invaders have wished to wipe out all trace of the greatness of the people they have conquered. A change of dynasty or of regime, even a change of taste, was enough to condemn great buildings to neglect and even to demolition. Repairs or additions were nearly always made in the style of the new era.

The restoration of a building, often revered solely on account of its age, was mostly in the nature of a reconstruction under new forms that revealed the new architects' lack of interest in the work of their predecessors. Not until comparatively recently have Europeans begun to regard ancient works as relics that have survived from a glorious past.

At first, their interest was simply one aspect of the universal curiosity of the age of the Renaissance, which devoted the same energy to exploring lands and seas as it did to the study of remote history, discovering, beyond

the immediate past, the more exciting record of Greek genius and Roman grandeur, precious relics of which still survived. These relics were greeted with enthusiastic admiration by the humanists who styled them "monuments" in the sense in which the word is used today.

While literary monuments—parchments and papyruses—were copied and published at that time and antique statues were cleared of debris and set up in palaces and in gardens, it must be admitted that many an architectural monument—even some of the most admired, which artists sought to imitate or equal—continued to be used as a quarry. Furthermore, as old values inevitably collapsed, Europe seeking its ideal in classical antiquity, broke with the Middle Ages; the works of that period met with less and less understanding and were often ruthlessly destroyed.

Not until the 18th century did Europe at last rediscover its medieval past and, following the teaching of certain enlightened spirits, learn to take an interest in the works of all civilizations, in the monuments of all countries, of all peoples and of all ages.

This interest was matched during the same period by the beginnings of scientific archaeology, thanks to which the study of ancient relics replaced the "treasure hunt" of the preceding centuries. The miraculous excavations of Pompeii and Herculaneum and, later, the exploration of towns that had been swallowed up by the desert or the jungle, made it possible to resurrect vanished civilizations. Ruins acquired some meaning; and castles and old dwellings, churches and convents likewise took on a new significance.

By now we have reached the point when we can read the full record of man's mastery over the earth in those monuments which reflect the spiritual aspirations or social ideas of their times, as also in the buildings and engineering works which served to meet the needs of everyday life. Walls, gates, aqueducts and canals, bridges and old roads; the traces of industries which have died out, illustrating how the elements were tamed by human ingenuity; every vestige bearing the imprint of human thought, everything denoting the triumph of man over nature, seems worthy of our interest.

Even in the case of buildings whose purpose was strictly utilitarian, some concern for elegance can usually be detected in the handling of practical problems, while there is likewise an underlying harmony of proportions, a rhythm, an interplay of line and colour, and dimensions which reflect and harmonize with a given site and environment, all producing a lasting impression which will be a source of pleasure and satisfaction to builder and spectator alike. This pleasure is still felt, even after many generations, even if we know nothing of the history or are ill prepared to understand the artistic language of the time, for beauty responds to a craving of our innermost being.

As we begin to appreciate these long-ignored treasures, we become aware of their fragility and of the gravity of the dangers which threaten them. An over-dry or humid climate, sun or frost, sand or wind, vegetation or parasites and, still worse, atmospheric pollution, will cause any ancient building to crumble slowly unless it is constantly cared for. Then, again, a monument may suffer from excessive care or exaggerated renovations. Or it may

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deteriorate as the result of unfortunate changes in its setting.

Man himself is still the most dangerous enemy of man's creations—not only man the warrior, the avenger, the vandal, the iconoclast; the town planner, the engineer, the builder, are just as much to be feared when, thinking only in terms of practical efficiency, they confine their ambitions to the task in hand and take no care to check the harsh dynamism of their age—the economic pressures, the explosive growth of cities, the chaotic spread of suburbs and industrialized areas. The example of dams and great hydro-electric works submerging all cultural property, both what is visible and what still lies hidden beneath the soil, reflects in gravity and extent the whole problem of the choice that has to be made between the heritage of the past and the requirements of the future.

Between these two imperatives a compromise must at all costs be found. The saving of the monuments of Nubia, following an appeal made by Unesco, proves that it is feasible, even on an international scale. And it is at the international level that the protection of monuments against the dangers of wholesale destruction must be sought, since the maintenance of world peace is obviously a prerequisite for their conservation, now that no building from the past can withstand the effects of modern armaments.

ANOTHER conclusion can be drawn from the large-scale works of restoration which have been carried out during recent decades, namely that we now have the necessary technical means to protect, repair, restore and, if necessary, even transfer any monument. Moreover, in many countries monuments are afforded special protection by legislation which regulates and services which carry out all operations in this field. This would appear to mean that we are equipped to ensure the full conservation of the wealth of archaeological remains and other monuments in the world.

Would such conservation be likely to turn large parts of the world into one gigantic museum? The champions of the monuments, even the most stubborn, think so extreme a solution unfeasible; they agree that the course of technical progress cannot be reversed, and that in certain cases it may require the sacrifice of buildings associated with outmoded ways of working or of living. It is also clear from experience that the dynamism of an era will have the last word. Tremendous efforts are needed to save even a limited number of monuments.

Even then, well-planned and conscientiously applied legislation, good technical facilities and adequate financial means are not enough. Monuments are certain to be preserved only when ordinary citizens, realizing the value of a given monument and knowing that with it something irreparable will be lost, then combine of their own accord to ensure that it will be preserved.

Monuments must be publicized and understood, and friends be found for them, near and far. Thanks to the extraordinary facilities for mass communication now available, this can be done. The outline of a temple buried in the depths of the desert becomes familiar to magazine readers, cinema audiences and children at school. Tourists, once they know about them, are only too eager to visit monuments that lie along their route and offer an excuse for excursions, even to out-of-the-way sites.

If the fate of a monument rests in the hands of an effective administrative service, it will arouse interest far beyond the circle of specialists and be a familiar image to great numbers of people who will regard it with affection, even if they are from other countries, some of them remote indeed.

There is reason to hope, therefore, that this attitude will become world-wide, fostering in all peoples an awareness of their joint responsibility for monuments. In launching an International Campaign for Monuments, Unesco seeks to deepen this awareness and to facilitate the preservation of the cultural heritage of mankind while at the same time enhancing this heritage by making monuments an integral part of the everyday life of peoples.

Admittedly, if we view the monuments of architecture in relation to their restless environment, many obstacles to that integration will become apparent. It often seems that certain buildings—especially those that no longer serve any practical purpose—are simply there in defiance of the modernization in towns, as an obstacle to traffic and a heavy financial burden. If, therefore, a monument is fortunate enough still to serve its original purpose—religious, political or social—it will be essential to see that it continues to do so, even if some practical draw-backs are involved; otherwise a use should be found for it, or it might be adapted to some new purpose.

If it is to survive, it must, in one way or another, take its place in ordinary life, help to mould the taste of the younger generation, serve as a splendid illustration of an historical period, remain or become a symbol, the emblem of a town or a township, a familiar landmark in some rural or urban area. It could serve as a starting point for town planning, the justification for the maintenance or the creation of a park, a place of rest in our feverish cities, bringing to our distracted times a moment of quiet repose.

Most states, fortunately, are alive to the advantages of doing this in the interests of tourists, and citizens as a whole are not altogether indifferent to the resulting aesthetic, cultural and practical benefits.

Nevertheless, it is impossible to make intelligent use of a monument unless the responsible authorities, the town planners and architects, and the owners of land and house property come to agree that there is no common denominator between the drawbacks entailed in the preservation of a monument and the absolute gain derived from its beauty, its human significance, and its spiritual aura.

IT is thus clear that, in the last analysis, the question of the life or death of monuments is one that closely concerns us and that the issue is very clear-cut: either we assume in regard to the future the responsibility for allowing a large part of these relics of past civilizations to disappear, and thereby deprive future generations of the opportunity of becoming acquainted with the works handed down to us from the past, by sacrificing them to the arrogant and intoxicating adventure of a new world which will be the negation of the old; or else we accept the principle of human solidarity in time as in space and, adopting a new approach, play our true historical role, knowing that we live in an age in which it is no longer necessary to destroy in order to create, which is perfectly capable of making respect for what has been handed down from the past part and parcel of its most daring plans for the future, and which has the means of helping present-day man to commune with the great works of his ancestors.

By adopting the second attitude, there can be no doubt that we shall enhance the chances of seeing a more humane civilization arise, in which the knowledge of the past will find its place side by side with the discoveries by which man hopes to better his future.

THE CUPOLAS OF KIZHY

An open-air museum of architectural monuments in wood has been set up at Kizhy on an island of Lake Onega in northern U.S.S.R. As its centrepiece it has the famous ensemble shown below: the 22 cupola Church of the Transfiguration (right) built in 1714 (Peter the Great is said to have drawn up its plans); the 10-cupola Church of the Intercession built in 1764 (left) and between them a belfry built in 1874. The Church of the Transfiguration is solid timberwork and does not contain a single nail (detail in photo right). Restoration of this church, which was seriously damaged during the Second World War, was completed last year.

Photos © A.P.N.

THE NEW SCIENCE OF ART CONSERVATION

by Harold J. Plenderleith

IT is not easy to explain in simple terms what is meant by the conservation of a monument. Broadly, a monument may be made of any material and it may be of any size, but a simple generally accepted classification recognises two main types, the fixed object and the portable object.

The temple, the statue and the totem pole are examples that have to withstand the action of wind and rain, heat and cold. Old ships such as the Vasa (raised from the sea bed in Stockholm harbour; see "Unesco Courier," July-August 1960) or the Victory (preserved at Portsmouth, England), provide special problems concerned with the control of humidity, prevention from shrinkage and protection from insect attack. Mural paintings, on the other hand, are normally sheltered from extremes of temperature, but may be invaded by capillary moisture and attacked by mould.

The portable objects within the category of monuments are legion, comprising bygones as diverse as swords and accoutrements, musical instruments, vestments and incunabulae, the contents, in fact, of our museums, picture galleries, libraries and archives. A new science has developed in the conservation of all these things. We are emerging from the dark ages when medicine men applied secret nostrums and a gullible public was content to shirk its responsibility and leave its priceless cultural heritage in the hands of the soi-disant restorer.

The name "restorer" for the want of a better one, still clings, but the connotation has changed beyond recognition, for the modern practitioner is ideally a highly skilled technician with basic training in physics and chemistry and biology. He is organized, probably a member of the professional association, the International Institute for Conservation. He preserves a complete documentation of all his work, publishes his results and discusses them in conferences held at regular intervals by the International Council of Museums not only with his fellow restorers, but with museum scientists and historians of art. Science in our generation is at last working in the service of monuments and of museums in no spirit of arrogance, but in full co-operation with the art critic and the archaeologist (1).

It is tempting to digress and discuss the cause of this awakening, but one need only consider the great improvements in the sensitivity of scientific equipment and the endless variety of modern synthetic materials waiting to be exploited in a knowlegeable way, in order to realize that today, more than ever before, science, rightly applied, can be the handmaid of the arts.

Synthetic materials have been developed to such an

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(1) For further reading, see "Archaeology and the Microscope", by L. Bieck; London, Lutterworth Press, 1963.

Art treasures on the operating table

extent that they no longer need claim to be substitutes for natural products, for they often provide improved properties that are novel and of great utility. Modern synthetic materials include the detergents and the wetting agents and the waxes that are actually soluble in water, and very useful as leather dressings, synthetic fibres, synthetic adhesives and the very interesting compound called "soluble nylon" that can be used as an impregnating medium on tempera painting for consolidating a powdery surface without imparting any residual shine. It can also be used to consolidate pottery from salty deserts whilst the salts are being washed from it and is readily removed afterwards if desired.

It is now often possible by soft X-rays to record through a painting the original crayon sketch made by the artist on his canvas. Only a few years ago this would have been regarded as miraculous. It is also possible to remove a fresco from the wall and leave behind the mural painter's original sinopia drawing, thus exposing for the art critic a stimulating new world of interest.

In Moscow, certain painted icons have been found to be built up in a series of strata on one and the same wooden panel, and a special technique has been evolved whereby it is possible to recover the lower and older ones without losing those above. Pictures can be transferred from worm-eaten panels and mounted on sound ones, and in other cases rotting canvases are replaced by new ones. In fact, the most delicate material and most complex structures can be saved by the skill of the modern restorer.

IN the field of archaeology, the mechanism of metallic corrosion, a universal cause of deterioration, is now well understood and means have been devised to remove it or, at option, to arrest its advance without necessarily destroying the aesthetic character of the piece. There is hope, therefore, that many of the world's monumental treasures that are threatened by exposure to atmospheres polluted by industrial fumes may be saved—objects universally acclaimed such as the splendid gilt bronze horses of St Marks, Venice, or the lion and griffon of Perugia—whereas, in the absence of these recent advances in the service of conservation, their years were numbered. The threat will remain, however, as long as we are content to breathe air that is polluted with sulphur compounds. The cumulation action on metals is as devastating as it is on the human subject!

An altogether new field has been opened up by the physicist in the application of his methods, of non-destructive testing, and these have already made notable contributions to the conservation of monuments. An example that immediately comes to mind of modern science in action is the discovery and excavation of an Etruscan tomb.

First the scientist applies his stethoscope to mother earth. The detection equipment of the Lerici Foundation in Italy, famous for its discoveries of Etruscan tombs (see "Unesco Courier," Feb. 1957) can be compared with a stethoscope in sensitivity. When the scientist detects a discontinuity beneath the surface he can pin-point the centre of a subterranean chamber and fix his instruments with such care that on drilling vertically and inserting a special tubular periscope with appropriate lighting, he has a complete view of the interior. All that has been done to make this possible is to drill a little hole in the ground 10 cm. in diameter.

That, however, is no more than the beginning. He has located the tomb. He now proceeds to insert a small

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An injection for immortality

A wooden statue, its hands clasped in prayer, is given an injection against a sickness that would otherwise have reduced it to powder. Something like 80 % of works of art in wood are infested by insects which thrive on a diet of dry, old wood—rich in starches and sugar. They live and proliferate in the wood, boring out innumerable tunnels in the process. Today special chemicals are injected which seep throughout the infested object, kill the invader insects and prevent reinfestation. Objects which have been seriously weakened by wood-boring insects can be consolidated by deep injections of plastic solutions or emulsions. Sarcophagi from Egypt and, thousands of sculptures in all parts of the world have been cured by these techniques, as have celebrated "invalids" such as the magnificent woodwork in Westminster Abbey, London and the famed sculptures in the opera house of the Château of Versailles.

© Solvay, Paris

Detecting the 'heartbeat' of a tomb

camera into the tube and he takes a series of six colour photographs, rotating the camera through 60° between each. When these photographs are laid out in orderly succession, there is a complete record of the paintings that commonly adorn the walls, of any bas-reliefs and of grave goods, etc. Here is the monument disclosed for study yet without a sod being turned. A decision has now to be taken and an important deduction made. Is the tomb worthy of the time, care and cost, necessary for its scientific excavation? If not, it can be sealed and concealed and we are the richer for the documentation that has already been obtained.

If, however, it is decided to excavate, the photographs will show how to go about it for they will disclose the position of the entrance door: the location of the entrance passage can be deduced, and instead of breaking in through walls or ceiling, as would have happened in previous generations, the excavation can be so conducted as to avoid all damage by entering the tomb from the side by its own passage and doorway. But this is not the end. The monument will be destroyed unless humidities are maintained, at least until the mural paintings can be removed and conditioned to the drier environment above ground.

We have learnt much from our wartime experience of fire and pestilence and, not least, that the slow decay of susceptible material by exposure to damp can be quite as destructive as the damage from detonations of high explosives.

A picture may disappear from a wall eaten up by mould growths, leaving only a nondescript stain. But even here science may have the last word. I know of paper bearing invisible drawings having been nursed into shape and successfully doctored by chemicals so that the drawings were actually brought back to life again. Things that are invisible to the naked eye can be photographically recorded by using the methods of ultra-violet fluorescence, and, as is known in every police laboratory, there are several methods by which it may be possible to recover and decipher on charred or burnt documents writings or drawings when the ink seems to have been completely burnt away.

The Italians are past masters at what might be called preservation medicine and surgery. This is born of a natural facility in the studio and laboratory and the untold wealth of their cultural heritage which demands incessant attention. For it is not true that a monument having survived from antiquity, will necessarily go on surviving. Nature is always in a condition of change and the change may be either sudden, as when an object is excavated, or slow and relentless, as when a building is allowed to fall into neglect.

FIRST come the rains, then growths appear of moss, lichens or algae, and the mortar is loosened. Ivy grows over the ruin, attacks the structure with its penetrating suckers. Humus is formed, plants root themselves, the level of the surrounding earth rises and capillary moisture weakens the foundations so that the building becomes derelict and in this condition it is liable to be used as an all-too-convenient source of stone for adjacent building or agricultural purposes.

How different is the picture when the aids of science are involved. The modern architect and chemist knows how to exclude moisture, prevent or destroy damaging organic growths without contaminating the stone, introduce a hidden armature of ferro-concrete, grout the walls with an approved cement, and, if the foundations are unsatisfactory or unstable hydrologically, there are simple means by which consolidation is possible using the methods of electro-osmosis as applied, for example, in Warsaw by Cebertowicz to prevent the Church of St. Anna from destruction due to the movement of the clay slope on which it rested. The clay was consolidated, the movement was arrested and a rock-like basis for the structure provided by the electro-deposition of calcium silicate.

Great advances have been made in methods of conditioning the air of museums and galleries to give constant figures of temperature and relative humidity and to remove dust and noxious contaminents. At least one war-time repository was constructed in an underground mine where, beforehand, the dew-point had been continuously exceeded and mushrooms were farmed commercially! Control methods were put into operation with the result that this mine, though far below the surface of the ground, became the perfect store room for the most sensitive materials—archives, textiles, books and even salt-laden Egyptian stele and other monuments: no single object suffered damage.

BUT major problems remain. How can one hope to deal with a monument carved in crumbling laterite exposed in a monsoon climate to alternatives of fierce heat and torrential rains? We do not know, but we can do some calculated guess-work which, in the scientific field, is often the precursor of the pilot-experiment that leads to an eventual solution. Not long ago waterlogged wood was considered to be practically beyond redemption. Now, the position is much brighter, thanks to a concerted attack by museum scientists working in several countries, e.g. in Poland, at the pre-Slav village of Biskopin which is gradually being recovered from its watery grave, on iron-age settlements in Switzerland and on the frail but interesting timbers from mines and from wells in the United Kingdom. Each country has something to contribute. National museums take pride in the quality of their conservation work and friendly exchange of information in all such matters is a feature of the present generation.

The conservation of monuments is of world importance, so much so, that an intergovernmental organization exists for the study of the preservation and restoration of cultural property, the so-called "Rome Centre" and this serves all nations with up-to-date information regarding methods and equipment and materials and helps with the training of young curators and museum technicians.

Its activities are known in many countries throughout the world. It has worked in collaboration with Unesco for the protection of the Buddhist temples of South Korea from destruction and staining by water and lichen growths, etc., and on Pakistan's Mohenjo Daro, being seriously damaged by salt crystallizations. It has also worked on Indian cave paintings darkened by shellac, on the painted tholos of Kasanluk in Bulgaria, whose colours were flaking off in layers, and on the Mayan site of Bonampak in Mexico, where wonderful frescoes have miraculously survived in the heart of the rain forests. Work has also been done in Morocco, Tunisia, Libya, Egypt and on many Middle East sites, and on medieval gold crosses in Vienna. Biblical scrolls have been studied, dissected and made available to scholars.

Patiently, continuously, this labour of conservation goes on, a constructive service to preserve for posterity the monuments of the past that have served through the ages as a solace and an inspiration to mankind and will continue to do so in generations to come.

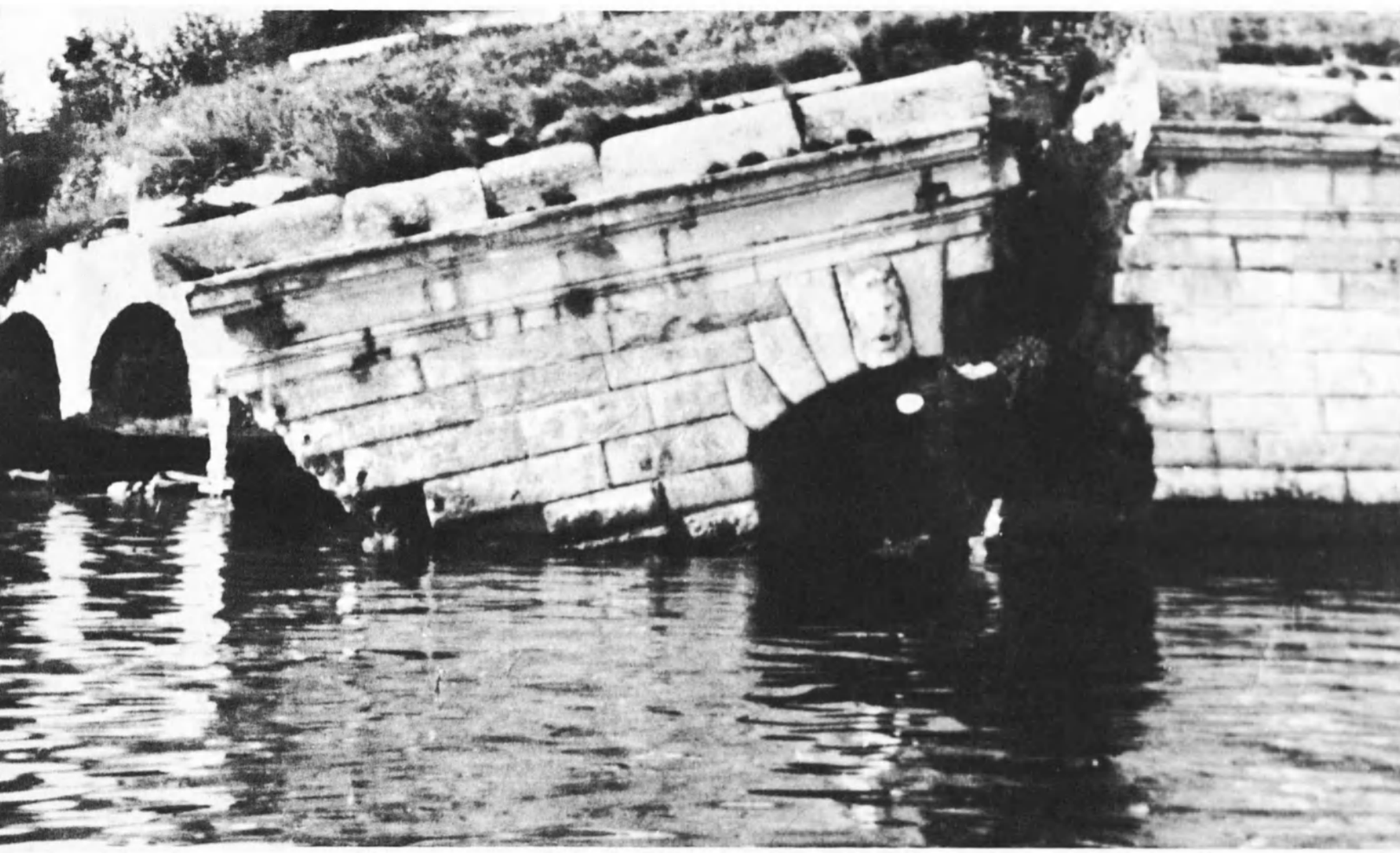
HAROLD J. PLENDERLEITH *is director of the International Centre for the Study of the Preservation and Restoration of Cultural Property set up by Unesco in Rome. Before becoming the first director of the Rome Centre in 1959, he was professor of chemistry at the Royal Academy of Arts, London, and Keeper of the Research Laboratory at the British Museum. His best known work is "The Conservation of Antiquities and Works of Art" (Oxford University Press, London, Toronto, New York, 1957).*

VENICE
a sinking city

by Pietro Gazzola
State Inspector of Antiques and Fine Arts, Rome

This striking photo shows how the massive walls of the fort of Sant'Andrea in Venice have split open and begun to collapse into the sea. The fort at the entrance to the port of Venice, was built in the 16th century by the famous architect, Michel Sammicheli. In all parts of Venice great monuments are gradually subsiding.

Soprintendenza ai Monumenti



WITH its graceful buildings and the incomparable magic of its light and colours, Venice is a spectacle that makes us forget the fragile foundations beneath its architectural splendours. Venice, nevertheless, is a sinking city.

Built on wooden piles driven into the mud of several hundred tiny islands separated by a thousand canals that are now its streets and avenues, Venice first used the sea as a natural protective rampart against the hordes of barbarians which swept over the mainland in the 5th century A.D. Gradually it became one of the most beautiful and unusual cities the world has ever known.

Washed by the clear waters of the Adriatic, Venice evolved, not in some haphazard fashion, but on the basis of strict scientific principles. Its builders had precise knowledge of the marine depths around it and were able to calculate with accuracy the relationship between river currents and the surge of the tides. The result was a harmony so perfect that Venice seems to have arisen from a single, almost miraculous act of creation.

But today this remarkable monument to science and vision is in danger. Its deepest foundations are being worn away and the city is slowly sinking, dragged down by the subsidence of part of the lagoon bed.

Surveys show that Venice has sunk 111 millimetres (four inches) in the past fifty years. Actually, according to the Venetian Institute of Arts and Sciences, the subsidence varies from place to place. Beneath the soaring Campanile, or bell tower, of St. Mark's in the heart of the city, the ground has sunk 183 millimetres (seven inches).

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Archivio Artistico

ST. MARK'S IN THE WATER. The Campanile of St. Mark's has sunk seven inches in the past 50 years. Above, high tides have flooded the famous square in front of the XIth-century cathedral. St. Mark's and the Doge's Palace in the background seem to be standing directly in the Venice lagoon. The Campanile can be made out in air view, below.

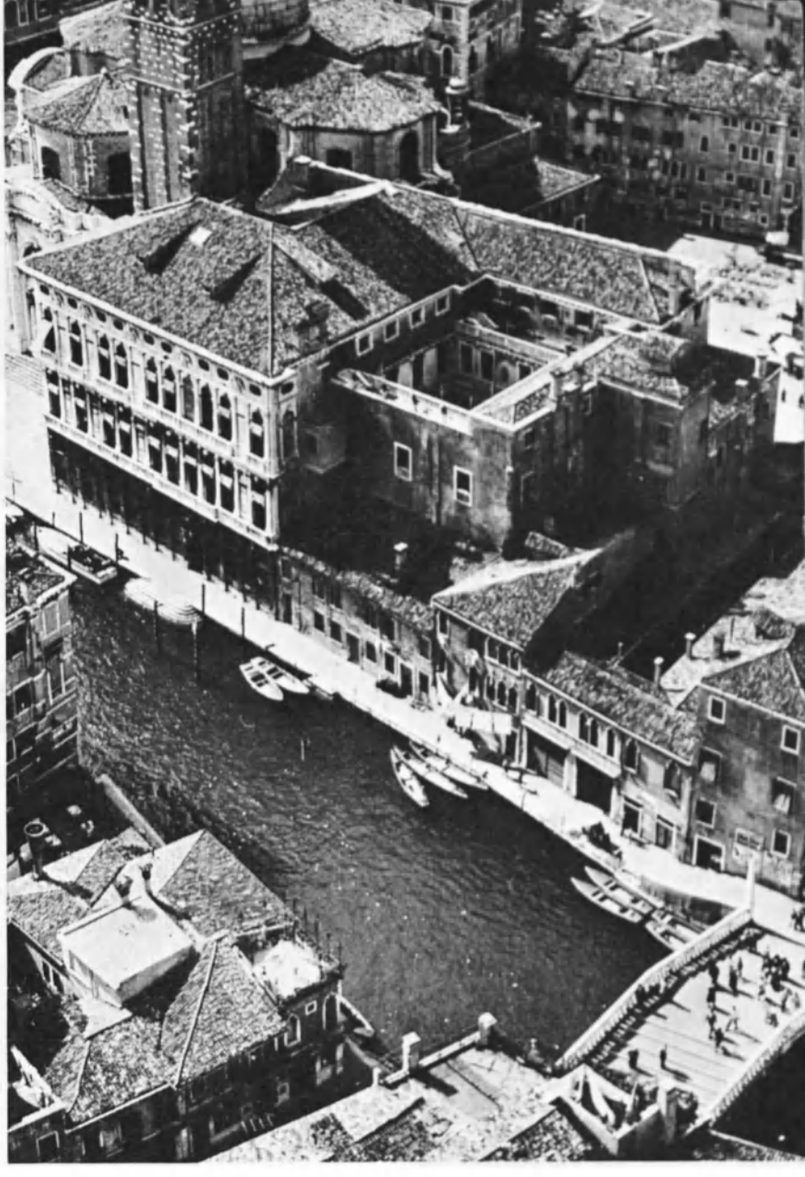
When industrial expansion created a need for swifter, more direct communications, Venice deepened its existing canals and made new ones. But the courses of the new waterways were contrary to Nature's system of currents and upset the natural balance of the lagoon waters.

The old canals were man-made but they kept logically to the meandering of the currents; artificially straight, the new ones were subjected to a greater impact of tidal ebb and flow. Currents and eddies of unprecedented force began to strike at the foundations and sub-foundations of the city until surface subsidence showed that they were eating into the deepest layers. The most spectacular and alarming symptom was the partial collapse of the walls of the fortress of Sant Andrea on the Lido.

The only way to avert these dangers is to restore the harmony of the system on which Venice is "anchored" before it becomes irreparably compromised.

Another danger threatening Venice is erosion. This has become worse in recent years because of the great fleet of motor boats which have progressively replaced the gondola, once the traditional means of transport in a city of 378 bridges where the use of motor-cars is ruled out. The great surge of water raised by the passage of these powerful motor boats through the canals gnaws away at the city's foundations.

Erosion is also to blame for worsening decay in the foundations of buildings attacked by salt water, whose corrosive power is increased by the deposits of oil ejected from motor launches. Since the canals were deepened they have been more affected by tides, and as tidal movements carry off sand from one part of the sea bed to another, erosion increases. The famous Lido beach, for example, has been reduced to a narrow ribbon of sand whereas a few miles away, at Punta Sabbioni, a new beach is being built up.



Photos © Archivio Borlui

The exceptional structure of Venice poses singular problems and demands constant watchfulness and supervision by the city authorities. With its magnificent Byzantine, Gothic and Renaissance buildings and others of a distinctively Venetian style it presents a unique architectural ensemble. But these buildings too are subject to ills, old and new: saline erosion, the droppings of pigeons, pollution from the air. All these take their toll, eating away the ornamental facades of palaces and churches and modest houses alike.

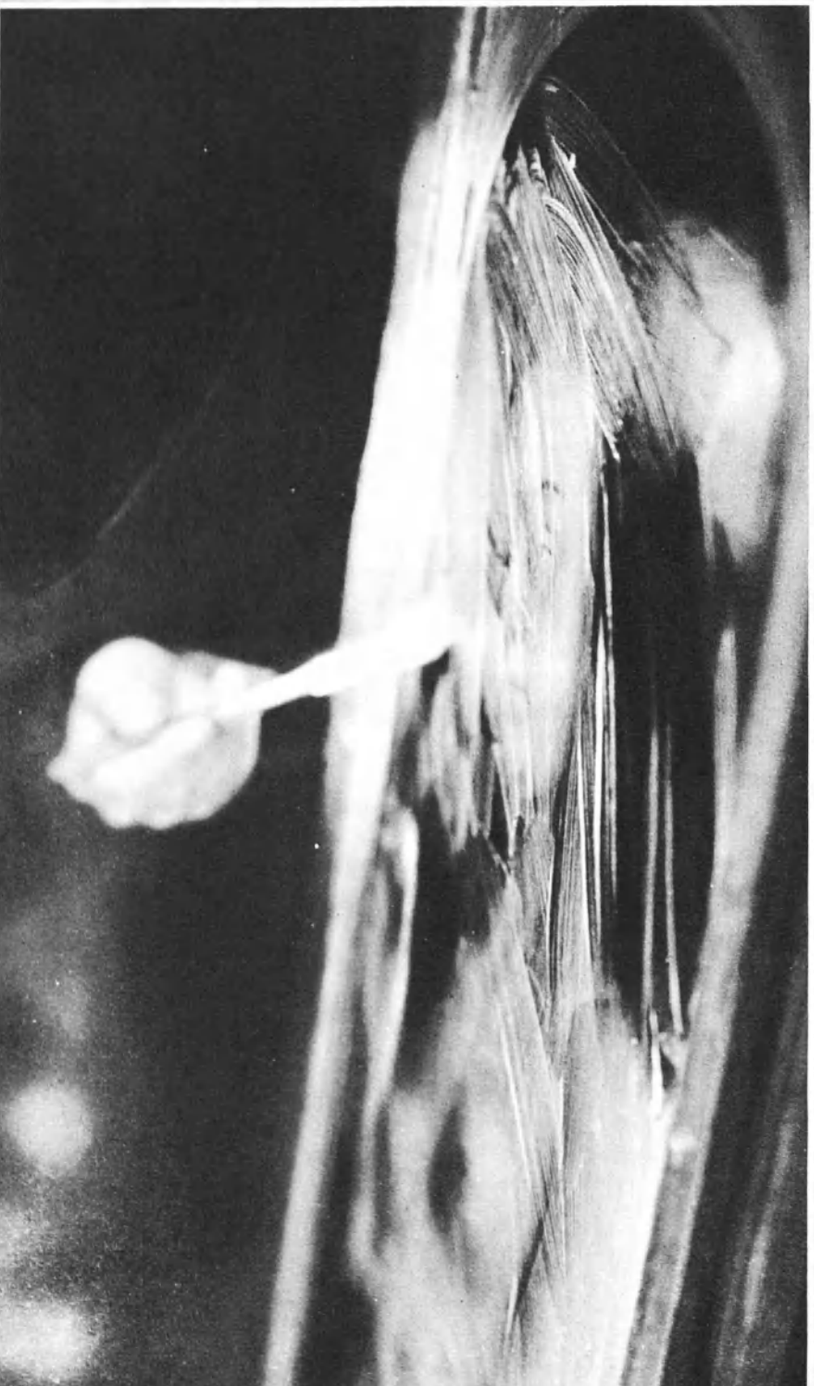
Decay has gradually reduced whole areas to a state of picturesque semi-ruin, where the inhabitants seem to care less and less about the state of the buildings and where many edifices of great architectural beauty now serve as storehouses or have become slum-dwellings. Yet even these less important architectural elements still add something to the character of the city and should be preserved and revived.

Only a comprehensive plan of rehabilitation can save Venice. In view of the vulnerability of its foundations the whole question of transportation will need to be reviewed. Individual solutions will have to be found for each problem, including possible revision of the paths of canals and the rehabilitation of the poorer districts. This will not only open the way to further social and economic progress, but will safeguard the city's great wealth of monuments

CITIES IN A CITY. Each square or "campo" of Venice is a miniature replica of the piazza San Marco with its bell tower, its church, fountains and open market. Campanile in photo above right can just barely be seen to left of square. Venice boasts not only its innumerable canals and bridges, large and small, but a meandering network of narrow streets and alleys which no motor vehicle could possibly enter.

AIR VIEW. Washed by the waters of the Adriatic, Venice was built on 370 tiny islands in the lagoon. An automobile and railway viaduct (foreground) leads from the mainland into the city like an umbilical cord. At the end of the viaduct motorists must leave their cars and "take to the boats." Venice's main waterway is the S-shaped Grand Canal which cuts the city in two. To the seaward side of Venice is the Lido beach.

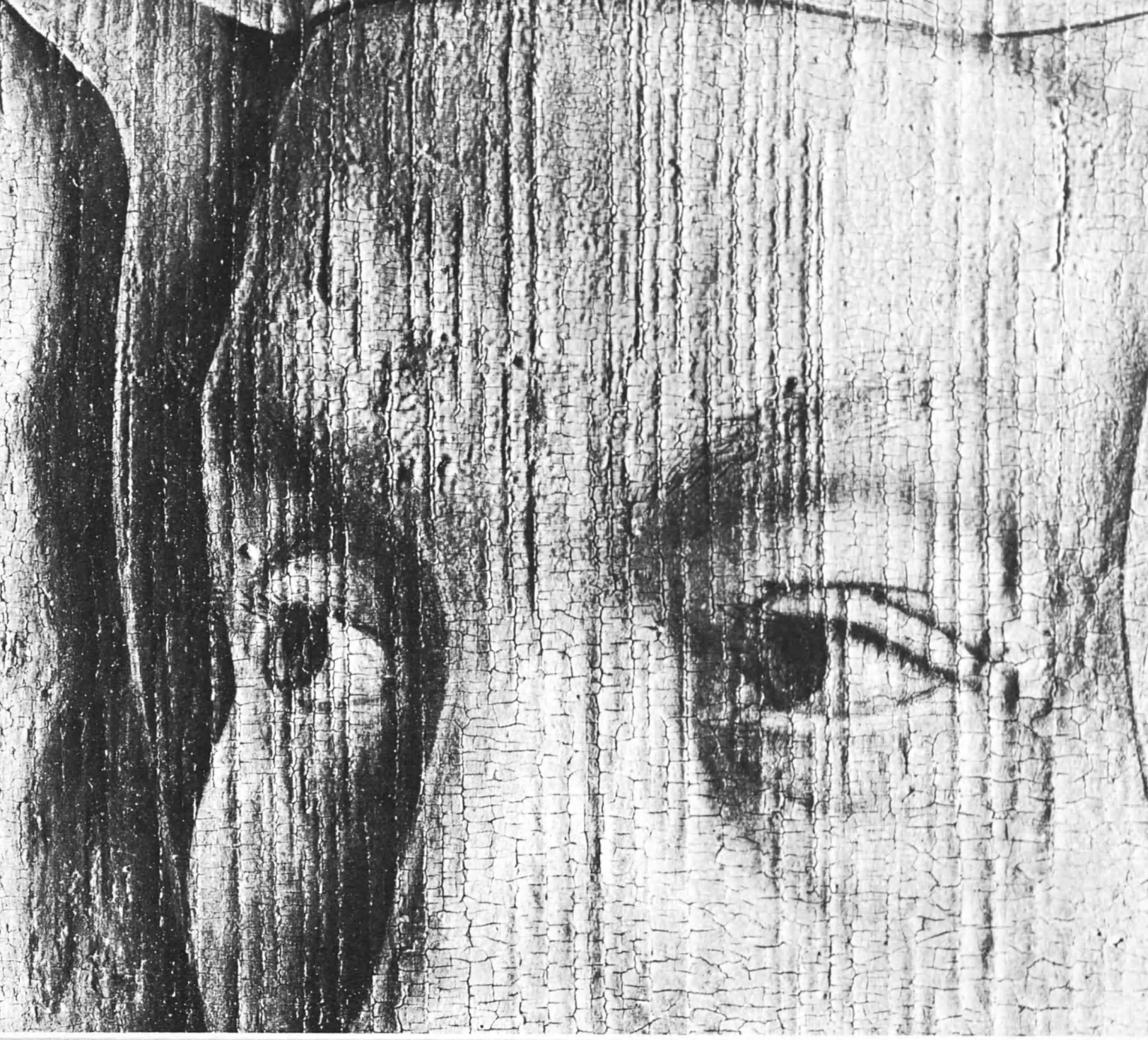
TOOLS OF ART SURGERY. One of the most delicate of all restoration operations is the removal of the paint used to retouch a work during past restorations. When this old paint is exceptionally hard and resists the use of solvents, the restorer has to scrape it away gently with pencil-shaped engraver's tools (left).



WARPED WITH AGE. Works executed on wood are often the most fragile of all paintings. Right, detail of Van Eyck's masterpiece, "Adoration of the Lamb," painted in 1453. This face was photographed under a raking light while the work was being restored in Brussels. The cracks in the paint have been caused by the warping of its wooden panel support; the wood itself has split along the graining. Left, restorer at work on a panel of the "Adoration of the Lamb".

PROBING RAYS. The first step in any restoration is a thorough examination of the painting and its support (wooden frame, canvas, nails etc.), X-rays are used to probe inside the work and its backing. X-ray below clearly shows the outline of a cradle used to strengthen the frame about 70 years ago. From photographs taken by infra-red, ultra-violet and fluorescent light the state of each layer of paint is revealed.

Photos © A. C. L. Brussels



The care of old paintings

Few of the works of art that have come down to us from the past are as fragile as paintings. To protect them from the ravages of time and to preserve or restore their original beauty are problems that have for long preoccupied the curators of museums. In the past many masterpieces have suffered from well-meaning but clumsy attempts at restoration and some of the work done by certain restorers has been attacked as "sacrilegious" or destructive. Until recently, the care of old paintings was the subject of violent controversy. Even today certain kinds of damage are still irreparable, but at least we now know how to avoid causing harm to paintings. It is now recognized that each painting needs individual study and treatment and for this purpose there exist elaborately-equipped laboratories—"art hospitals" where with the help of ultra-modern techniques, restoration attains the highest aesthetic standards. Since 1946 the sum of experience and skill in different countries has been pooled increasingly through the efforts of the International Council of Museums. Through this perfection of conservation techniques the art restorer has become better equipped to deal with the complex problems of his calling and is able to avoid the errors of the past.

Five-year cleaning for 'Last Supper'

Solario's copy of "The Last Supper" leaves the Abbey of Tongerloo for treatment in the Brussels "art hospital". Below, cloth-tipped rod serves restorer as arm rest and also protects painting from accidental damage.

Leonardo da Vinci's most famous mural, "The Last Supper" (1494) was reproduced on canvas by one of his pupils, Andreas Solario. This giant work (see also back cover) went from Italy to France and then to Belgium where it is preserved in the Abbey of Tongerloo. It has not come through its travels unscathed. It suffered serious damage when it was hidden underground during the troubled times of the French Revolution. And blundering attempts to restore it in the past have not improved its condition. In 1959 it was decided to hand it over to the skilled restorers in the Institut Royal de Patrimoine Artistique in Brussels. Here a team has been working over the painting inch by inch for the past five years. Its restoration is not yet finished, but already the work has regained an original vigour and vitality that varnishing and retouching had obscured and deformed.

Unesco - René Caloz

Top, patiently and carefully a specialist removes varnish and overpainting applied by earlier restorers until he reaches original paint. In the process any traces of damage to the original work are also revealed. In infra-red photo (centre) old repairs on this detail from "The Last Supper" are clearly visible. Bottom, the same detail after cleaning. Damaged parts have been brought to light, and at the same time original values are restored to the faces.

Photos © A. C. L., Brussels

Aphrodite's city resuscitated

Aphrodisias is a striking example of an historic city now saved by government action. For centuries peasants had installed themselves amid the ruins. Below, fragments of ancient columns used to prop up village building. Turkish Government has built a whole new town to remove the inhabitants and restore the ancient site.

THE traveller in modern southwest Turkey who finds himself following the fertile, winding course of the old river, the Meander, now called the Menderes, may take a rocky, dusty path which rises among olive groves towards the foothills of the encircling mountain ranges where a snowy, jagged peak, Baba Dag, towers against the calm and open sky.

If he does so he will come, after some time, suddenly upon a misty wilderness of poplar trees and through them he will see, veiled at first and then startling in their white and shining splendour, a row of perfect Ionic colums rising from the ground. He has arrived at the place which was once the loveliest and most famous of all the cities dedicated in ancient times to Aphrodite, goddess of beauty; to the city called Aphrodisias built there in the 3rd century B.C. in classic Caria, now the province of Aydin.

From its earliest times through the turbulent passage of Greek, Roman and Byzantine history this city held a unique distinction: it was the fountainhead of art, the workshop of beauty which supplied an Empire. Generation after generation of its carvers and sculptors sent their work in the inimitable Carian marble through the seaports of Asia Minor to the rest of the world.

Alexander the Philosopher was born in

CONT'D ON PAGE 23

Colour page, opposite

Carved stone head peers from undergrowth covering innumerable fragments of once-proud buildings of Aphrodisias.

Centre colour pages

Top left: White Ionic columns standing among young poplar trees are believed to be remains of porticoes around the agora or public square of Aphrodisias.

Bottom, left to right: Fallen glories of Aphrodisias, where graceful Greek columns still rise above tumbled masonry, form the backdrop to a cabbage patch or serve to buttress bank of an irrigation ditch.

Top right: One of many striking reliefs of gods, goddesses, satyrs and other mythological figures adorning the temple of Aphrodite.

Bottom right: Villager of Geyre stands amid relics of halcyon period when Aphrodisias was famed centre of art and religion.

All photos © Ara Güler, Istanbul

Stadium for 30,000

Colour page, opposite

Top: The magnificent stadium of Aphrodisias, one of the most imposing in the whole Mediterranean area had places for 30 000 spectators. Its immensity can be judged from comparison with cattle browsing in its grass-grown arena.

Bottom left: A mutilated but still majestic marble head by a sculptor of Aphrodisias. It was found on the probable site of a palace.

Bottom right: Housewife's chores amid fragments of marble carvings and columns for which Aphrodisias was once famous in the Roman world.

Below : In 1963 the Turkish Government transferred the villagers of Geyre from their homes in the ruins of Aphrodisias to a new settlement of modern houses. Excavation and the eventual restoration of the ancient city can now go on unhampered.

All photos © Ara Güler, Istanbul

Aphrodisias; medicine, rhetoric and philosophy flourished there; music and drama had their festivals, Byzantine Christianity made the city a Bishopric with many churches. Somewhere between the 11th and 14th centuries the city declined and gradually sank back into the quiet plain that had borne it, until in the 17th or 18th century a small village called Geyre came into being to straggle uncertainly over its fallen glories.

Over the years the villagers of Geyre unthinkingly made free with the artistically priceless ruins scattered around them, appropriating them casually into the pattern of their daily life. Fragments of fallen Ionic colums were used to prop up the wooden houses and street posts of the village; carved sarcophagi served as wine presses or troughs to catch the waters of mountain streams; a splendid relief from the old city decorated a farmer's barn and one of the world's most perfect examples of Ionic columns which probably had once been part of a great temple to Aphrodite offered the spectacle of their majestic, classic beauty from the midst of a villager's cabbage patch.

In 1959 the Turkish Government decided to save Aphrodisias the Beautiful. By 1963 it had built an entirely new settlement for the people of Geyre a mile away from the site of their original village—a modern community with school, infirmary, barns and storehouses and fertile pastures for the villagers' livestock.

No longer hampered by the presence of the villagers excavation and restoration work is now going on in Aphrodisias under the aegis of the Turkish Ministry of Education and the Direction of Antiquities and Museums and with the help of a team of archaeologists from the University of New York.

The most grandiose relic of Aphrodisias is the magnificent stadium, one of the most imposing in the whole Mediterranean area, which accomodated 30,000 spectators. Another gem is the covered auditorium with rows of marble seats and elaborate stage decoration of handsome statuary. Elsewhere the dismantling of a wall revealed within the foundations a nine-foot image of Aphrodite buried there when the city became a centre of Christianity.

Aphrodisias was a city of marble. When it won fame and prosperity as a centre of art and religion, an extensive building programme used the nearby supplies of Carian marble to raise the magnificent monuments now being brought to light.

So many artistic treasures are being discovered that it would seem the long dead artists of Aphrodisias left their greatest testament, not spread throughout the world in museums, but in Aphrodisias itself. Now the brilliance of this art is being brought to light from the ruins among the poplars and olive groves of the tranquil Carian plain—birthplace of a city of grace and beauty.

MEXICO. The sculptures and painted walls (detail in photo) of Bonampak, a temple in the jungle, are an illustrated encyclopaedia of Maya life in the 7th century A.D. Bonampak is being seriously damaged by damp. Three missions went there (1961-62-64) to study ways of protecting its treasures.

Unesco

NUBIA. The results of Unesco's International Campaign to Safeguard the Monuments of Nubia are familiar to readers. Each year, from 1954 to 1964, a Unesco mission was at work in Nubia. In photo a sphinx from the sacred avenue of Wadi-es-Sebua temple is being moved to a new site.

U.A.R. Antiquities Service

SYRIA & LEBANON. In 1953 Unesco sent to Syria and Lebanon two missions of first-rate importance for the preservation and restoration of many monuments. In Syria these sites included the ruins of Palmyra (photo), an ancient city now isolated in the desert; cruaders' castles, including the famous Krak des Chevaliers; the mosques of Aleppo amd Damascus; the ruins of Doura-Europos, a Selucide city (4th century B.C.). Among those of the Lebanon were many Phoenician, Roman, Christian, Arab and Ottoman monuments in city of Tripoli, and ruins of Baalbek, among the richest remains of the Roman world. In 1960 another Unesco mission was sent to Syria.

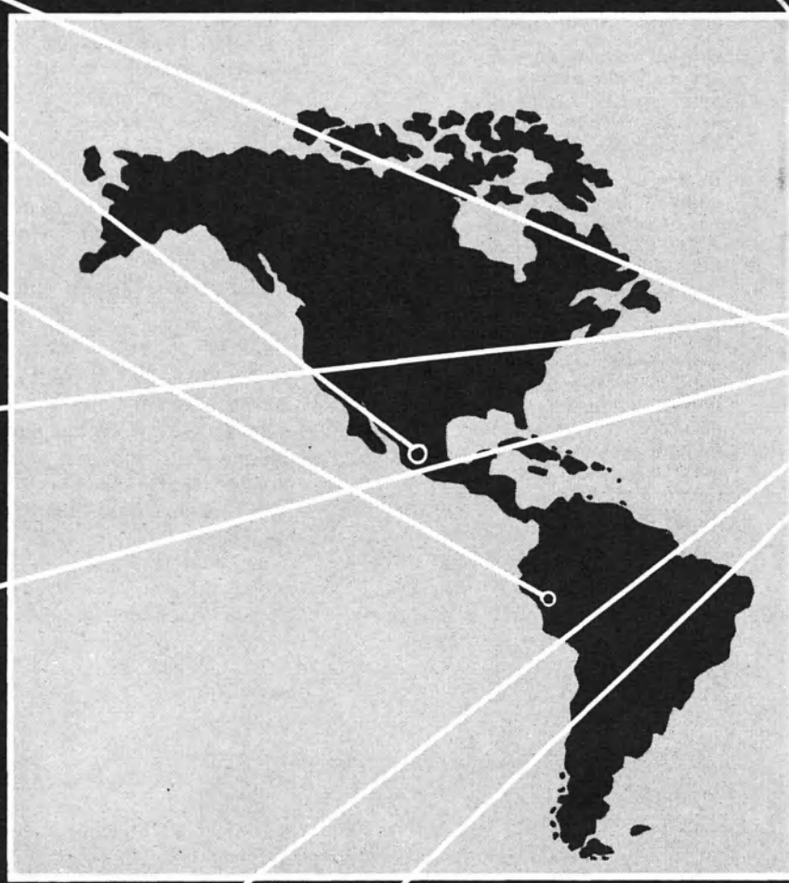
© Lucien Hervé, Paris

AFGHANISTAN. World's largest statue of Buddha, 173 feet high (photo) at Bamiyan threatened by collapse of 3,000 tons of rock from towering cliff above. In 1963 mission studied protective measures for this world-famed shrine and for important monuments in Herat, Ghazni, Mazar and other cities.

Unesco - A. Lézine

Unesco - Péquet

PERU. In 1951 aid in restoration of Cuzco, ancient Inca capital damaged by 1950 earthquake. In 1964 collaboration in setting up central art laboratory at Lima. Studies made of Peruvian monuments including ruins of Chan Chan (photo) former capital of Chimu Empire (1000-1600 A. D.).



CZECHOSLOVAKIA. A wealth of Gothic 14th-century frescoes is preserved in Czechoslovakian monasteries of Strakonice and Sazava, the church of Slavetin, the fortress of Karlstejn and the Emaüs monastery in Prague. In 1960 a Unesco mission studied the conservation needs of these works. Frescoes at Prague were damaged during the Second World War; others, like those at Karlstejn (detail in photo) are victims of decay.

Institute for the Preservation of Monuments, Prague

SPAIN. To care for its rich heritage of artistic and cultural treasures, Spain has recently set up a central Institute of Restoration equipped to apply the latest techniques of the modern "art clinic". Technical advice on the creation of the institute and the training of its staff was given by a Unesco mission in 1963. The institute will give priority conservation to the Romanesque sculptures of the monastery of Ripoll (photo) in northern Spain and to 14th century murals in the Cathedral of Toledo.

P. Guilera

CAMEROUN. A 1964 mission examined palace of Sultan Njoya (inventor of Bamoun alphabet) at Foumban with view to restoration (photo shows palace entrance with sculptured balcony). Inventories were made of works of art—sculptured panels, furniture, masks—preserved in palace and houses of chieftains.

Jean Gabus, Neuchatel

ALGERIA. Its monuments are a pageant of history in stone: the theatre and baths of the Roman city of Cherchel, the Islamic monuments on the same site, the Byzantine fortress of Setif and the Roman city of Timgad whose ruins (photo) are crumbling under the invasion of wild fig trees. In 1963 a mission examined Timgad and recommended for priority restoration the famous mosque of Qal's Beni Hammad.

Unesco - P.A. Pittet

MOROCCO. Rich in ancient cities dominated by graceful minarets: Fez, Meknes, Marrakesh—each a monument in itself, whose balance and character would be destroyed, as a Unesco mission warned in 1962, if modern multi-storied buildings were added to them. The mission studied the setting up of museums and libraries for the conservation of ancient documents and recommended special preservation treatment for mosaics in Roman city of Volubilis (photo) where excavations are proceeding.

Office Marocain du Tourisme

BURMA. Studies for preservation of murals made in 1961, principally at Pagan, (photo) former capital, with its forest of pagodas (once 4,000 existed). Many buildings beyond repair but murals (covering 250,000 sq. ft. in 250 pagodas , most of them dating from 11th to 13th centuries) could still be saved.

© A.C.L. Brussels

REPUBLIC OF KOREA. Monuments needing protection inspected by mission in 1961 included Buddhist mountain cave temple of Sokkulam (photo) on Mt. Toham where infiltrating water in damaging statues and bas reliefs. Preservation measures proposed for Sokkulam and for other monuments including great standing Buddha at Kwan Chok Sa.

Office of Public Information, Republic of Korea

INDONESIA. Extensive studies of important stone monuments made in 1958. Mission reported to government on protective measures required, particularly for giant temple of Borobudur in Java. One of world's great Buddhist monuments, its stone carvings and effigies (photo) are victims of tropical rains, extremes of temperature and invading vegetation. Borobudur has 1,400 bas reliefs and 500 statues.

Unesco - Marc Riboud

MAP OF UNESCO CONSERVATION MISSIONS

We present on these pages brief accounts of some of the missions to safeguard monuments carried out by Unesco since 1951 at the request of governments.

JORDAN. Missions in 1956 and 1960 studied preservation problems of preclassical and classical sites and monuments, crusader and Islamic castles and towns with medieval buildings such as Bethlehem and Jerusalem (photo shows walls of Jerusalem with Moslem cemetery in foreground). Jordan's problems of town planning and landscape protection were given special attention.

Unesco - Hans Stekeweh

IRAK. Studies of ancient monuments, many of clay brick and fragile stone damaged by water infiltration, made in 1954 and 1961. Sites examined included Baghdad, Nineveh, Ctesiphon and Hatra. Photo shows Arch of Ctesiphon, near Baghdad, the world's widest single-span vault of un-reinforced brickwork (5th century A.D.).

Irak Ministry of Culture

IRAN. Three important missions (1960-62-63) studied one of world's richest areas for historical monuments: Persepolis, Pasargadae, the Ziggurat of Chuga Zambil, palace and paintings of Ispahan (now being restored). Among measures recommended: restoration of upper part of Ziggurat (terraced tower temple) and protection against erosion of Persepolis (photo), an ancient capital already partly restored.

B. Riazi-Harlaut

PAKISTAN. Three major missions (1956, 61, 64) have assessed problems of Mohenjo Daro the great capital of the Indus River Valley civilization of 4,000 years ago. Immense ruins covering some 250 acres are being eroded by invading salt-impregnated waters from Indus River and irrigation canals. Methods of protecting ruins and of pumping away salty water now being studied. Pakistan Government requested Unesco mission to advise on measures for saving site. Investigation and report by the most recent mission considered by specialists as a model of its kind. Photo shows a monkey god statue found at Mohenjo Daro.

© Paul Almasy, Paris

STONES ALSO DIE

by René Sneyers

IN recent years every country has been made increasingly aware of the grave deterioration of the world's architectural legacy. There is frequent talk of the "disease" of stone, a ruthless scourge which for some time past has been attacking monuments and damaging them increasingly fast.

Everyone now knows that walls and statues which have stood the test of time have been seriously damaged during the last ten years, and among them are reported to be famous works like the sculptures of Chartres cathedral—masterpieces of Gothic art.

What is this malady, the first appearance of which was noted in London as long ago as 1620 when it was attributed to the corrosive action of coal smoke? In 1646, Londoners even presented a petition to Parliament asking for a ban on the admission to London of coal from Newcastle, which was considered particularly harmful.

One of the serious problems of towns and industrial centres is the pollution of the air by smoke from the combustion of coal in homes and factories. This smoke contains solid particles such as soot, and gaseous substances such as sulphur dioxide and carbon dioxide. The sulphur dioxide dissolved in water—in fog, rain and snow—turns into sulphurous acid and then into sulphuric acid, the corrosive power of which is well known to everyone.

It has been estimated that the soot carried in smoke represents as much as 6% of the weight of fuel consumed. Soot also contains up to 5% of sulphuric acid, and polluted air up to 5 mgr. of sulphur dioxide per cubic metre. As each kilogramme of coal consumed releases about 20 grammes of sulphur dioxide, the million tons of coal burnt every year in Greater Brussels, for example, discharges approximately 20,000 tons of sulphur dioxide into the atmosphere —enough to transform 31,000 tons of limestone annually into gypsum, the mineral from which plaster of Paris is made.

Fortunately only a small part of these impressively quantities of corrosive gas comes into contact with the limestone of our monuments, and most of it is washed away by rain. In industrial areas, incidentally, rain distributes from 13 to 27 tons of sulphuric acid on every square mile each year.

The increasing consumption of heavy oil (diesel and fuel oil) gradually aggravates the situation, because their yield in sulphur dioxide is even greater than that of coal. In the port of Los Angeles the 50,000 tons of petroleum products consumed each day, a few years ago discharged

LASCAUX
under treatment

One of the world's most remarkable collections of prehistoric art, the cave paintings of Lascaux, has been closed to the public since April 1963. Following the discovery of the cave in 1940 thousands of people have visited Lascaux to marvel at images of horses, cattle, stags and ibex whose colours had been preserved exactly as Palaeolithic man painted them 18,000 years ago. Had more been known about bio-chemical corrosive action that can occur in underground sites when Lascaux became a celebrated tourist attraction, certain precautions would have been taken. As it was doors were fitted at the entrance and this innovation together with the movement of thousands of people through the cave altered the atmospheric conditions that had preserved the paintings intact, causing microscopic plants and bacteria to proliferate and spread over the walls. Examinations were made by a committee of scientists and measures were taken to safeguard the paintings. Left, one of the Lascaux paintings under examination. This strange beast with the heavy body of a hippopotamus and a feline type of head, has curious horns which have earned it the name of "unicorn". Each wand points to the centre of a "swarm" of tiny plants. All the growths were removed before they could damage the colours. The cave is now "convalescent," but conditions there are still being studied attentively and Lascaux must for the time being remain out of bounds to the public.

Photo © Dr. J. Bauer, Faculté de Médecine, Marseille

400 tons of sulphur dioxide into the air. Urban centres are thus producing sulphuric acid on an industrial scale.

On the calcareous stones of buildings in Western Europe, on surfaces sheltered from the rain—generally those facing north or east—as well as in corners where the stone is not washed by rainwater, a hard, impermeable incrustation forms, rich in gypsum, which collects soot and dust. The formation of this black crust of gypsum is the first stage of decomposition.

The attack continues beneath the incrustation, and the second stage of decomposition begins with the infiltration of mineral salt solutions (gypsum), which by crystallization of their salts then cause the stone to disintegrate. The gypsum eventually overcomes the resistance of the limestone and breaks up the surface layer.

When the stone does not resist smoke it is said to be "sulphatable". The crust becomes detached from the stone, forms blisters or cankers, cracks, then scales off, exposing to the elements a powdery surface which is easily eroded by rain and wind.

The pollution of the atmosphere of our city and industrial centres is thus the general cause of the weathering of limestone. Even so only part of the limestone used for building in the polluted areas is affected. The causes are therefore likely to be more complex, and to the undoubted action of smoke must be added the action of water in circulation, the characteristics and quality of the stone and its position in the building. Some exports put the blame for disintegration on temperature variations of the crust which under heat expands much more than the healthy underlying mass and the repeated strains caused by alternating expansion and contraction finally split off the crust from the stone beneath. Other scientists explain the formation of sulphates by bacterial action. It is observed however that healthy stones are found to be infested with bacteria, while damaged stones have none.

The resistance of stones to the formation of sulphates has been determined in practice by observation of their behaviour in monuments. No treatment now known is capable of arresting the formation of sulphates in limestone. Because stones exposed to rainfull are usually clean and healthy, while dirt and disintegration are found in spots which receive no rain, it is generally thought that the surest way of prolonging the life of monuments is to clean the stone with water, used in a gentle stream or a fine spray.

Research is now being carried out on various methods of treatment proposed by specialists and the industrial sector, to determine the conditions under which these treatments are applicable and whether a protective treatment after cleaning is likely to extend the useful life of the cleaning operation.

The extent of damage due to sulphate formation has now rendered a decision urgent. But there is still no absolute proof of the value of using protective agents on natural stone. The best policy is to take steps to reduce the damage caused by soot-laden smoke (dust removal and washing), and where possible, to transplant factories, and especially large generating stations, so that they may discharge their smoke elsewhere than in urban centres.

Strangely enough, sulphate cankers also form on stone other than limestone, such as porous standstone. In this case careful investigation always shows a high calcium sulphate content in the crust, and this is found whenever limestone is placed above sandstone. This "contamination" also occurs on soft bricks placed under calcareous rocks;

CONT'D ON PAGE 30

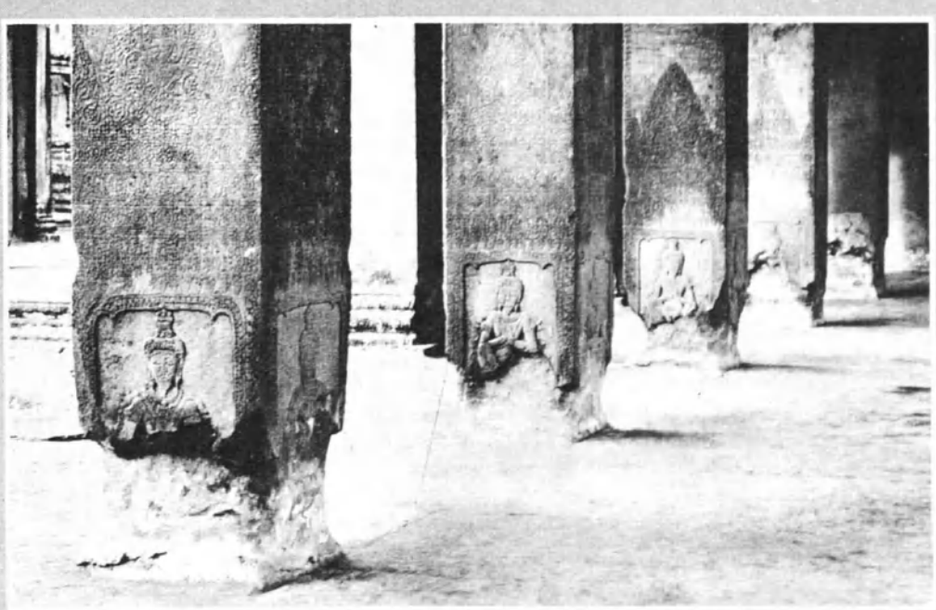
Above, stone steps in the palace temple of Angkor Wat after reconstruction. Undermined by water infiltrating from the ornamental lake, they had caved in (below). Restored to regular alignment, they are now protected by reinforced concrete foundations and drainage system.

ANGKOR
before & after

These gigantic four-headed towers of Bayon Temple at Angkor Thom have been damaged by lichen. In foreground, heads before and after cleaning.

TODAY Angkor is rising from its ruins. Magnificent pyramid-shaped temples covered with finely worked stucco reach towards the sky as they did when Angkor was capital of the Khmer Empire. To the world, the name Angkor, in Cambodia, personifies the harmonious art of the Khmer people which flowered gloriously between the 9th and the 13th centuries A.D. For five centuries, while Angkor was abandoned, its temples fell into ruin—attacked by erosion, broken up by infiltrating tropical rains, strangled by invading vegetation. Today, reconstruction is only one of the tasks of restoration. The stones must be protected from constant attack by physical, chemical and

Photos E.F.E.O. - Angkor Conservation



Bases of these pillars in a gallery at Angkor Wat have been attacked by an invisible enemy—bacteria—which have caused damage throughout the temple.

biological ills. Experts from the Museum of Natural History in Paris, working with art specialists from the French Far East School and the Cambodian authorities, have drawn up a "catalogue" of these ills. Sandstone that appears healthy comes away in layers exposing badly-decayed stone. In one place stone is friable and crumbles into dust. In another, bacteria, fed on the droppings of bats, eat away reliefs. In the temple of Bataneyi Srei dark patches disfigure the rose-coloured sandstone. What look like the traces of a great fire are actually incrustations of manganese oxide. But happily science is now able to deal with ravages that only yesterday were quite irreparable.

The destructive salt of the earth

such bricks too show signs of corrosion cankers. Often the calcium sulphate originates in the lime mortar or cement used in bricklaying.

Stones are frequently contaminated by salts other than calcium sulphate. These soluble salts from the soil—alkaline and alkaline earth nitrates, sulphates and chlorides—are crystallized at the surface of the stone and the developing crystals create enough force to destroy the stone's cohesion and disintegrate it.

Unesco recently published a report on the preservation of the important historic site of Mohenjo Daro, in Pakistan. The ruins of this great city in the Indus valley, 4,000 years old, were excavated between 1921 and 1930. Since the beginning of the excavation the water level on the site has risen by five metres as the result of the construction of irrigation canals. This water with a high saline content has impregnated the bricks—the basic material of the ruins—which have become saturated with mineral salts. The crystallization of these salts on the surface of the building materials causes the latter to disintegrate so rapidly that it is certain that in a few decades the ruins will have lost all their meaning.

Systematic studies were made at Mohenjo Daro by three experts: Dr. H. Plenderleith, Director of the International Centre for the Study of the Preservation and Restoration of Cultural Property, in Rome, and two specialists from the Netherlands, Mr. T. de Beaufort, an engineer specializing in hydrology, and Dr. C. Voûte, a geologist specializing in soil science. Their work is a model of the type of study that can help to find satisfactory solutions to problems as complex as the treatment of great archaeological sites.

Starting with the archaeological and human aspect the experts dealt with the physical state of the city "in situ"; they analysed the building materials and identified the harmful substances and structures and the rate of deterioration, and studied the movement of water and mineral salts in the bricks and the effect of the salts on the bricks.

Analysis of the complex causes of deterioration, based upon a mass of topographical, geological, meteorological and hydrological data, made it possible to suggest possible methods of treatment. The actual method will not be decided upon until tests have been made for reducing the underground water level and for extracting the saline content by water sprinkling.

GENERALLY speaking the movement of water in stones has a decisive influence upon their survival, since it causes their weathering by sulphate formation or saline inflorescence. Water acts both as a solvent and as a vehicle for the dissolved substances in the joints and in the stones themselves.

For example, the softening of the shapes of Assyrian sculptures in gypsum alabaster is due to the transformation of limestones into water-soluble calcium bicarbonate.

Laterization is a typical alteration of inter-tropical regions; the word is derived from "laterite," meaning "brick," designating the reddish soil of the damp tropical zone, which in certain regions forms a sterile crust. Laterization occurs in regions with heavy rainfall and a high mean temperature. In time, most of the substances forming the stone disappear as solutions, leaving iron, silica and alumina and forming new iron and aluminium oxides.

Freezing in a humid environment is the chief factor in the destruction of stone in cold countries and mountainous areas. Everyone knows that a bottle full of water exposed to frost will break because as the water freezes it expands by 9%. Similarly, under certain conditions the water contained in the pores of building material can cause it to split (by breaking or flaking). Hence the French expression, "Il gèle à pierre fendre" (literally "It is freezing enough to break stone") to describe a heavy frost.

It has been established that the pressure exerted by the rapid freezing of water at -5° C is about 500 kilogrammes per square centimetre. This pressure can break many types of stone, because in this case the ice has not time to extend into the empty pores or to the exterior. That is why breaking due to frost is more often found in stone of average porosity than in highly porous stone and in stone saturated with water, that is, stone at the level of wet soil.

There may be considerable variations in temperature between day and night, between sunny and shaded surfaces and in material exposed to the sun and then cooled by rainfall. As rock is a very bad heat conductor, tensions capable of disrupting it may arise between the heart and the skin of the building material. In marble, this phenomenon sometimes produces curious deformations.

BUILDING materials can also be destroyed by the transformation of some of the substances in their composition. Thus marble and brick can be disintegrated by changes in the iron pyrites they contain. On coming into contact with moisture in the air, these pyrites form ferrous sulphate and sulphuric acid, which decompose the materials.

In humid tropical regions biological proliferation can cause serious damage both through bacterial action and through the solvent effect of acids produced by the lower forms of vegetable life such as mosses and lichens.

The higher forms of vegetable life also destroy stone, but their main action is mechanical, the swelling of roots and trunks leading to the break up of buildings.

Animal excreta, particularly of birds and bats, often cause considerable damage to monuments through the acids they contain which have exactly the same effect as the sulphating produced by atmospheric pollution.

Dust-bearing winds blowing in arid zones cause serious damage with very marked eroding characteristics. Protection is provided by screens of vegetation or fences of plastic-covered metal similar to those used on airfields or to the screen that protects the port of Marseilles against the violent Mistral wind.

Thus weathering is caused by the combined action of the elements (water, temperature, air) often associated with the action of live organisms. Its extent depends not only on the vulnerability of the mineralogical constituents of the rock—sandstone is more resistant to an industrial atmosphere than limestone—but also on the actual structure of the rock—a coarse-grained rock weathers more quickly than a fine-grained one. Where elements built up in layers, such as mica, are present in the rock, water is able to penetrate and liability to weathering increases.

Although the preservation of stonework has been studied for more than a century the results of many experiments have been so discouraging that it would be true to say no progress has been made over the past hundred years. The

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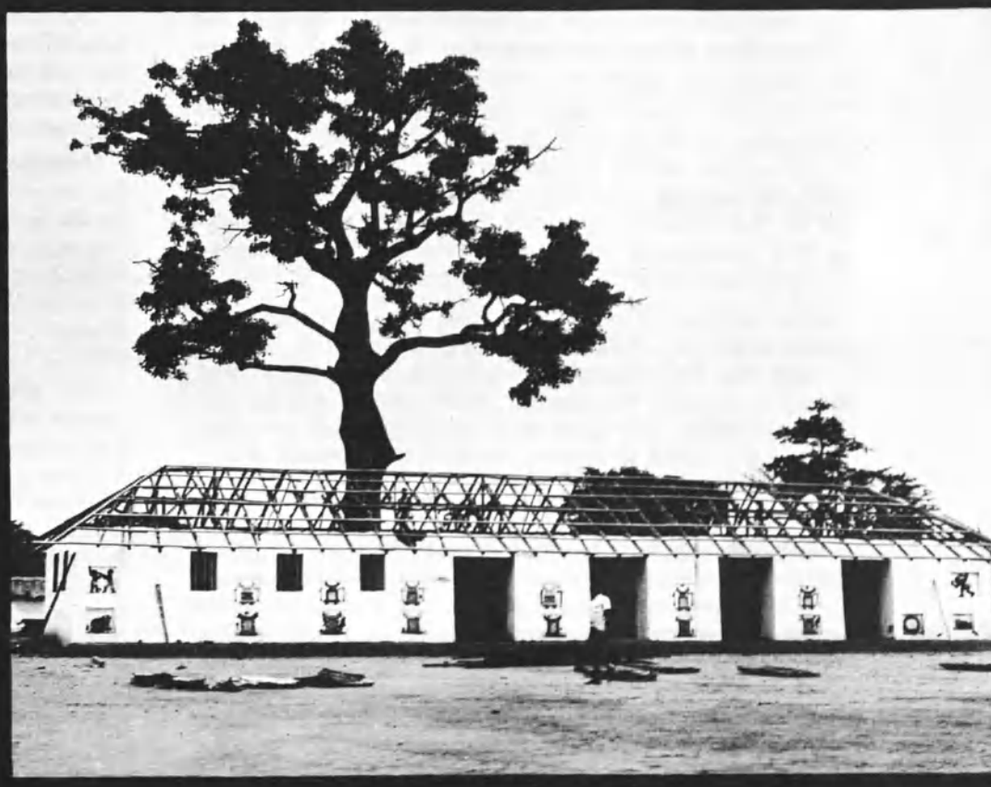
© Pierre Verger, Paris

ROYAL MONUMENTS FROM AFRICA'S PAST

In Abomey (Dahomey) an ancient West African cultural centre, the remains of the oldest royal palaces are now in the last stages of ruin. Their walls of dried mud bricks (right) have gradually crumbled away under the effects of erosion. Two palaces—those of King Guézo and King Glélé (19th century)—have been preserved. Built in simple architectural style, they are embellished with many bas-reliefs of coloured terracotta. Below, two mural decorations : a chameleon and a lion. Below right, restauration work at King Guézo's palace. Today the palace buildings house Abomey's museum.

Photos Jean Gabus, Neuchâtel



Photos © A.C.L. Brussels

Left, ravaged features of a 16th-century painted stone statue of the Virgin from St. John's Hospital, Bruges, Belgium. Cracks and wrinkles have been caused by each new coat of paint flaking off and also by progressive sulphating of stone. Right, statue after it had undergone cleaning and restoration with paraffin wax.

STONES ALSO DIE *(Cont'd)*

only treatment which can be unreservedly recommended for limestone affected by sulphating is to wash surfaces that rain cannot reach with water.

As a general rule the best solution is to prevent or reduce the causes of weathering. Since water is often at the root of the trouble, efforts should be made to reduce its infiltration by keeping roofs in good repair, by providing drainage for the ground in proximity to the building, and applying the appropriate traditional techniques for rendering buildings waterproof or drying them out.

When restoration is being carried out, it is important, despite a fashion which is becoming widespread, to bear in mind the advantages of preserving the external and internal coating on monuments, which have a considerable protective effect. Moreover, these coatings, which are often part of the original structures, should be respected merely for historical reasons.

Increasingly rapid weathering and more frequent restoration of historical monuments are occurring at a time of remarkable scientific and technical progress and increasing public interest in cultural property. People have come to regard monuments and works of art as public property, as something that concerns the man in the street no less than the specialist. Hence it can be expected that the authorities will plan to devote to **preservation** at least a proportion of the funds they spend regularly on the **restoration** of historical monuments.

Moreover in many parts of the world more and more laboratories are being established for the preservation of monuments. These institutions, collaborating with building material specialists, will no doubt discover the proper solutions for the grave problems which now confront us.

Unesco's Monuments Committee, the International Council of Museums (ICOM) and the International Centre for the Study of the Preservation and Restoration of Cultural Property, in Rome, have recently taken the initiative in commissioning the Laboratories Committee of ICOM—and in particular the Institut Royal du Patrimoine Artistique in Brussels—to carry out a large scale international investigation into the weathering and preservation of stonework.

The first contacts have produced a study on the localization and action of salts in limestone and sandstone used for building purposes, which will be published this year. A working group made up of specialists in the preservation of stone materials has also been set up. In this way it is hoped to sum up the present state of knowledge in the particularly delicate sphere of preservation of the materials from which historical monuments are constructed and to slow down the inexorable process of deterioration of these monuments.

RENE SNEYERS, *Head of Laboratory at the Institut Royal du Patrimoine Artistique in Brussels, is a specialist in the conservation of stonework in ancient monuments.*

The menace of the bulldozers

by John O. Brew

President, International Committee on Monuments

In the past 18 months Unesco has carried out a broad inquiry into the advisability of drawing up international regulations for the preservation of cultural property endangered by public and private works. The results of this study based on replies from some 40 member states were discussed by the Unesco General Conference which met in Paris last November, and which felt that an international instrument on this subject was needed. It authorized Unesco's Director-General to prepare a Draft Recommendation to be submitted to the next General Conference. The following article is based on the preliminary Unesco study prepared by Prof. J.O. Brew, President of the International Committee on Monuments and Director of the Peabody Museum, Harvard University.

FOR centuries and even millennia, constructions undertaken by man have destroyed vestiges of his past. On the other hand, from that time in the remote past when man evolved into a sentient being, some part of his thoughts has ever been devoted to speculations about his origin. The myths and folklore of our few remaining primitive contemporaries bear witness to this pervading tendency to speculate and seek evidence about the past. All religions of which we have any evidence and all of our various cultures are concerned with the history of how they came into being, as well as with the present and the future.

Formal attention to material remains as part of man's search for knowledge of his past seems to have begun with excavation in Italy and Greece of objects to provide inspiration for the architects and sculptors of the Renaissance. Later, in northern Europe, excavation produced background for the romantic movement in literature and art. In the New World, the first archaeological excavation was an American Indian site dug by Thomas Jefferson in Virginia in the latter part of the eighteenth century.

As the various peoples and civilizations of the world developed and cities were built, as an increasing proportion of the countryside was cleared for cultivation, destruction of earlier sites or buildings was inevitable. Sporadic efforts to counteract the results of such depredations appeared during the closing decades of the nineteenth century. The first archaeological salvage project in Poland was carried out in 1883.

It was also during the mid-nineteenth century that interest developed in the preservation and restoration of monuments which had been erected earlier in history, at times by peoples possessing cultural or religious traditions which differed from the present populations. The famous Serpent Mound in Ohio was saved from a housing development in 1887, excavated, and presented to the State of Ohio as a State park by the Peabody Museum of Harvard University. Perhaps the first attempts to modify or control modern construction dated from this period, when groups of buildings or even entire communities were protected in order to preserve their character and historical aspect.

HOWEVER, it is the great technological development and expansion of population in the second and third quarters of the twentieth century which produced the crises with which we are now faced. National and local governments have passed legislation which enables them, or interested private bodies, to establish parks, and to protect, preserve or restore national monuments and historic and scenic areas for the enjoyment, recreation or education of the people.

Internationally, Unesco has not only sponsored instruments dealing with some aspects of the problem of the safeguarding of sites and monuments, but has also aided many of its member states, through the Programme of Participation in the Activities of Member States, in the preservation of their cultural heritage. The International Compaign to Safeguard the Monuments of Nubia is an outstanding example.

There is no doubt, however, that extensive construction projects will occur universally and will touch all countries, great and small, in the next few years. No one with the prosperity and well-being of mankind in mind could possibly object to advantageous technological developments. The benefits will be extraordinarily large to contemporary populations. However, in attaining these indisputable gains, we must also give full consideration to the other, more intangible, but none the less important, historical and cultural values which play so great a part in the lives of all of us.

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The big culprits: motorways, airports, dams and pipelines

Among the modern technological developments threatening our cultural properties, the best known are the construction of dams for irrigation, hydro-electric power and flood control. Eventually, this movement will spread to almost all countries. These dams create pool areas of various sizes, from small to extensive bodies of water. Hundreds of them have already been built and are planned in many countries.

These operations are particularly destructive of cultural values in arid, semi-arid or prairie regions. In the great Missouri drainage in the U.S.A., it is estimated that 80% of the prehistoric population lived directly on the banks of the main stream or of its major tributaries. Dam construction during the last fifteen years has submerged all of the known sites of five major prehistoric cultures. The new High Dam near Aswan will produce a pool extending from the first to the third cataract on the Nile—over 500 kilometres. (See our last issue.)

In dam construction projects, there are a number of additional threats to cultural properties and sites apart from those which may be included in the pool area. The construction of a dam, particularly of a major dam, presupposes a considerable network of access roads which almost always damage archaeological sites or affect the ambiance of existing monuments.

Then there is always the camp to house the construction workers, which, in the case of a large dam, can achieve the proportions of a good sized city. In addition, many dams, even large ones, are earthen dams, which means that great quantities of materials must be excavated and brought to the dam site. Very often and, in fact, almost inevitably, archaeological sites occur in the borrow areas from which the earthen materials are extracted. All of these site and material areas must be surveyed, and important sites excavated, before the work begins.

The Great Serpent Mound in Adams County, Ohio, U.S.A., is one of the most famous of the earth monuments raised by the prehistoric ancestors of the Red Indians in North America, where many mounds representing birds, bears and other animals exist. The Great Serpent Mound (1,350 feet long) is the largest in the form of a snake. In 1887 it was saved from destruction as a proposed site for a housing development. The ground was purchased by the Peabody Museum of Harvard University, excavated and presented to the State of Ohio.
Development Department, Ohio

ANOTHER major threat to our cultural heritage is highway construction. This might, in the long run, be even more devastating than the river basin projects. Many people still do not comprehend the damage to the countryside occasioned by modern motorway construction. The great transcontinental super highways programmes in the U.S.A. and in Europe constitute, because of the width of the right of way and the methods of construction, one of the most active threats there is to our historical and archaeological record. Many people consider that these projects are more destructive than the construction of dams.

In highway construction, as in the dam projects, consideration must be given to areas quite outside the actual right of way. The extensive quarries and borrow pits from which gravels and other road metals are obtained also constitute a major threat to archaeological sites. In many areas of the world where such monuments as prehistoric mounds, barrows and tels are found, these structures are considered by highway engineers to be the cheapest and easiest sources for material for fills and other construction needs.

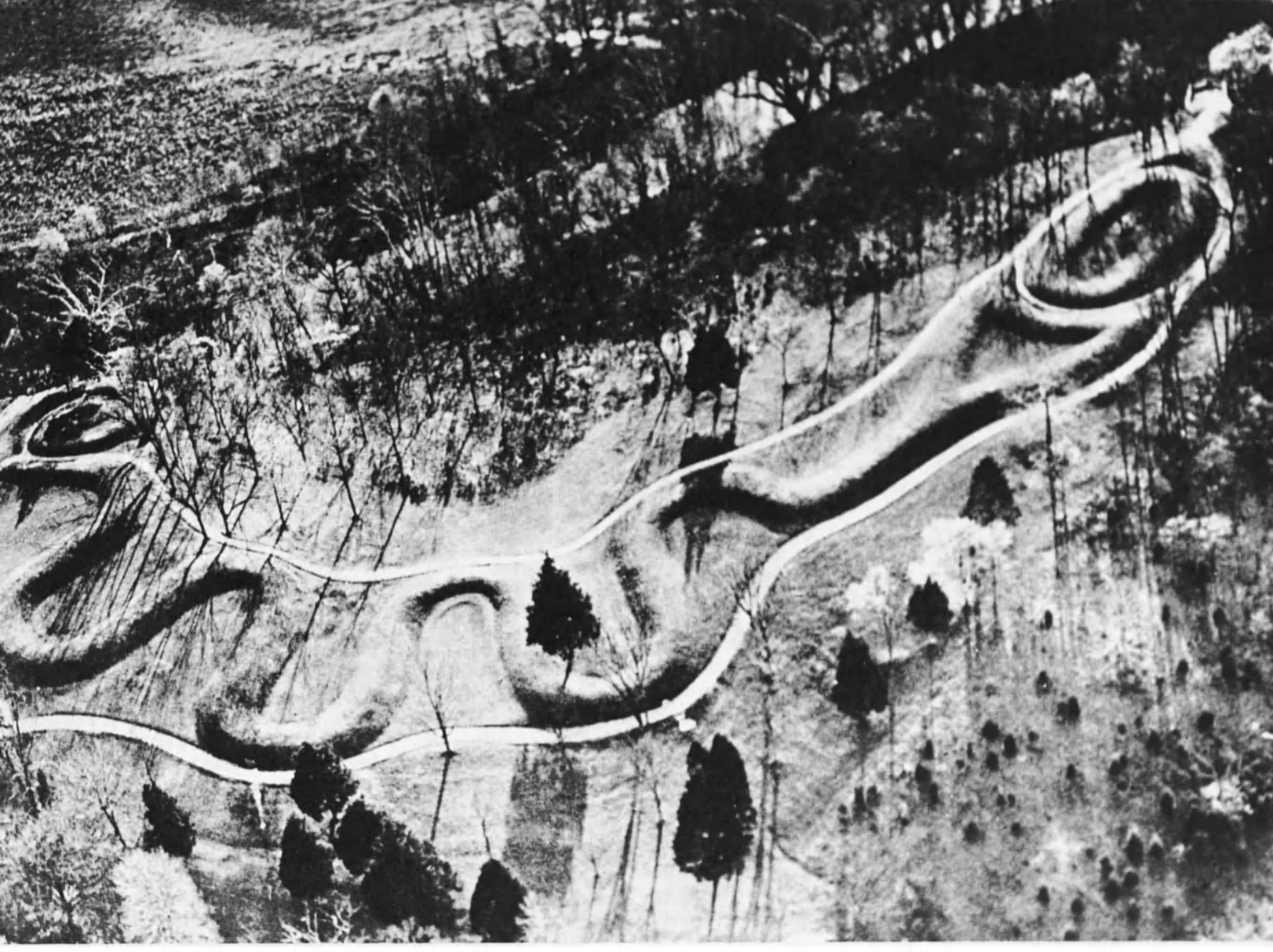
Another important aspect of modern technology in which provision must be made for the conservation of cultural values is the construction of pipelines for oil and natural gas. Such projects, because of the accidental fact that the sources of oil and gas are usually in regions of the world which contain important prehistoric sites or monuments, almost always cut through and destroy significant cultural remains.

The construction of power transmission lines, of both underground and pylon types, is another source of damage to sites. In Sweden, where these are always built by the State, provision for archaeological salvage is made. In countries where such construction is done by private companies, it is more difficult to control. In the U.S.A., effective co-operation has been worked out between power companies and State and local museums in Arizona and New Mexico.

Farming operations have always been a major threat to archaeological sites and historic monuments. Clearing of land and ordinary cultivation has probably done more damage to such sites in the past than any other single agency of our technology. Modern farming techniques, however, have increased this danger greatly.

Cities are expanding at an extraordinary rate all over the world. With this expansion comes, inevitably, the destruction of thousands of archaeological and historical sites, as well as many buildings which in themselves may not be worth conserving as national monuments, but which, as a whole, constitute a witness to a previous stage of development.

Along with the expansion of the areas of cities, there has also come into being in recent years extensive projects for



the redevelopment of the centre of the city well. In many European countries this was precipitated by destruction through bombing during the Second World War. Most important cities are built upon sites where people have had their cultural centres for many centuries and, in fact, millennia.

In the present decade, similar situations have developed in cities which did not suffer from war damage. Not only are urban areas expanding rapidly into the surrounding countryside, but also the older, obsolete buildings in the centres of cities are being taken down and large areas have become subject to "redevelopment". In many instances, the threat of such development has required that some of the old buildings be scheduled as monuments and preserved. It is certain that this process will continue and provision must also be made for salvage of the underlying archaeological remains before new construction takes place.

Examples can be cited of work already done by many Unesco Member States. In Norway, more than twenty excavations have been made in urban areas which have produced over 150,000 early implements and the remains of thirty medieval ships. The problem of urban development in Sweden is perhaps the most extreme of all the states. Thirty years ago, 85% of the population lived in agricultural communities. Now only 15% reside on farms. Provision is made for open areas and historical and archaeological monuments in the urban developments, but again this protection applies only to the most outstanding sites. Protection must still be sought for many important sites and buildings which will be destroyed in this urban expansion and which are not of the first magnitude, entitling them to national monument status.

A similar situation exists in India. Monuments and protected areas preserve the outstanding sites, but in the major urban developments, such as New Delhi and Bombay, hundreds of significant sites or monuments cannot receive this protection.

Another important threat to cultural properties is the extensive modern construction development which includes new factories, research establishments, airfields and military installations. Some can be considered under the heading of urban development discussed above. Many, however, cannot since they are deliberately placed out in the countryside because they need more land than is readily available in an urban setting.

It is still not generally realized how much land has been taken over recently for such enterprises. Particularly since the advent of jet planes, an appreciable amount of the surface of the earth is now devoted to airfields and the preparation of such fields involves the same type of bulldozer levelling as is used to prepare fields for irrigated agriculture, with the concomitant destruction of the archaeological sites or removal or destruction of historic buildings.

Manufacturing plants have also moved out into the countryside and occupy increasingly large tracts of land, which also has to be levelled and cleared of all previous

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The archaeologist alongside the engineer

encumbrances, including archaeological sites or ancient buildings. In this category must also be placed military and semi-military installations, research laboratories, atomic energy plants, missile and space exploration establishments.

One of the older industrial operations which has been a constant threat to archaeological sites is quarrying. Gravel pits in particular have been destructive of palaeolithic sites throughout Western Europe and especially in France, Germany and the United Kingdom. One of the more important Early Man sites in North Africa was destroyed by gravel pit operations in Casablanca in the early 1950's. Improved modern techniques in this field and also in open pit and strip mining have greatly increased the potential damage.

So far we have only mentioned the more important of the modern technological developments which are, with increasing rapidity, destroying our cultural heritage. There are many others; new railroads, sewers, cable lines, canals, levees, etc. Fifty and even only twenty-five years ago, this was a matter of concern to only a few countries. Now, however, it is of world-wide importance. There is not a single state whose national heritage is not endangered in one way or another by these forces.

A few countries have the type of strong central control which might make it possible to bring all of the various possible threats to cultural property by new construction under a single regulation. These, however, seem to be the exception rather than the rule. Major governmental projects such as the construction of dams, new land being opened for agriculture (e.g. the polders in the old Zuyder Zee in the Netherlands or the Navaho irrigation project in New Mexico (United States of America) can be surveyed relatively easily, and monuments then designated, objects preserved and archaeological excavations carried out.

In several countries, national services and organizations have stimulated the interest of private firms and individuals. In the western part of the U.S.A. and in the Arabian peninsula, the private pipeline companies have, for the most part, been very co-operative and have hired archaeologists to excavate in advance of their construction crews; they have even financed the production and publication of the scientific archaeological reports. This has not always been the case, however, and should be provided for by law.

The Archaeological Service in the Netherlands has over 200 correspondents throughout the country who help to keep track of new finds. The service also has close liaison in this matter with the Ministry of Agriculture.

In Norway, where an extensive inventory of prehistoric sites exists, the Archaeological Service works closely with the farm organizations. The question of budgeting is most important here, as the farmer cannot be compelled to bear the expenses of excavation.

In Sweden, the farmer is theoretically liable for the cost of excavation, but in the case of extensive mound sites, either the government or scientific foundations actually bear the expense.

In Czechoslovakia, there are nine scientific organizations which can excavate sites on farmland if these are brought to their attention. In the U.S.S.R., the situation is somewhat easier because there is no private farming and the costs of excavation must be borne by the institution which is working the site. In France, a classified site must be preserved, with a protective perimeter around it, but no satisfactory method has yet been devised to protect the myriad sites which are not classified.

In Denmark, the advent of deep ploughing has caused great difficulty in preserving sites. Although classified sites have a protective perimeter, the farmer has a tendency to plough closer and closer to the monument each year, and controls must be instituted.

The problems involved in the safeguarding of monuments and sites have become increasingly complex and urgent owing to the scope and very rapid expansion of public and private works of considerable magnitude contributing to the welfare and economy of present-day peoples. It is impossible to provide an absolute safeguard for monuments and sites, even if they are frequently the sole and, perhaps, most important witnesses to the achievements of past cultures.

On the other hand, various degrees of protection can be considered, beginning with modifications to be made in the plans of contemplated large-scale works in favour of important monuments and sites; and with transfers of selected monuments to areas outside of the zone directly affected by construction. For those monuments which do not possess sufficient importance or whose fabric does not permit transfer, careful records will have to suffice. Similarly, a selected sample of an archaeological site can be excavated to provide scientific documentation of the past.

It is necessary for the knowledge of our cultural history, as well as for social and economic reasons, that such measures be taken to safeguard monuments and sites endangered by public and private construction. This has been recognized by many states which have taken steps to ensure either the protection of sites and monuments or their salvage.

Previous Unesco Courier articles on the preservation of monuments

We publish here a short list of articles on the care and restoration of monuments published in past issues of "The Unesco Courier."

Italy's War-Damaged Art Treasures Lose Their Scars	November, 1949
Folk Arts in the Path of Ciivilization	December, 1949
New Life for Ancient Paintings (special number)	February, 1952
Restoring Quake-Hit Cuzco	February, 1953
SOS From the Past: Saving Our Heritage in Stone (special number)	July, 1954
Rome's "Book Hospital": Saving Ancient Manuscripts	February, 1957
Spina: Mystery City of the Etruscans.	February, 1958
Guatemala's Picture Hospital	March, 1958
Cuzco Celebration: Old Inca Capital Restores its Monuments	June, 1958
Save the Treasures of Nubia (special 52-page issue)	February, 1958
Rebirth of a Shattered City: The Story of Warsaw	March, 1961
Abu Simbel, Now or Never (special issue)	October, 1961
Nemrud Dagh: Excavation of a Mountain Sanctuary	February, 1962
Victory in Nubia (special issue)	December, 1964

To the young people of the world

a message
from René Maheu
Director-General of Unesco

for the New Year 1965

THE New Year opens. The institutions of the United Nations have decided to dedicate it to the cause of international co-operation, which they intend not only to celebrate with words, but also to demonstrate with deeds. May this then be the theme of my message, which carries with it my very best wishes to you, my young friends throughout the world.

International co-operation is both a necessity and an ideal.

It is a necessity for modern civilization, because the opportunities for development which this civilization offers can only be exploited, the problems of development which it presents can only be resolved, by organizing the communication of knowledge, the confrontation of ideas, the pooling of resources and the conjunction of efforts within increasingly extensive and complex systems which transcend the boundaries of nations, however vast and powerful these may be.

It is also an ideal—and by that I do not mean a dream, but a moral imperative—for men are coming to realize more and more that they are morally as well as physically interdependent. Each of us is increasingly aware that he cannot be completely happy if others are destitute or live under bondage, that he cannot be really at peace with himself if others are waging war against one another—in short, that he cannot attain his full stature as a man if injustice and want are preventing other men—all of them—from attaining that stature, like him and with him. I say all of them, for, once we admit in our thoughts or in our deeds, that some shall be excluded from humanity's family, we lose a part of our own individual humanity.

Such is the twofold justification for this international co-operation, which institutions like Unesco are designed to serve, and I call upon you to dedicate yourselves to it from now onwards, with all the enthusiasm and generosity of your young years.

For, although international co-operation needs sound organization and technique if it is to be effective, it cannot be achieved by those means alone. Even more, it needs a certain openness of mind, a certain warmth of heart, in short a readiness to serve, which itself implies a conversion to human brotherhood.

It is to this great cause that I call upon you to dedicate yourselves.

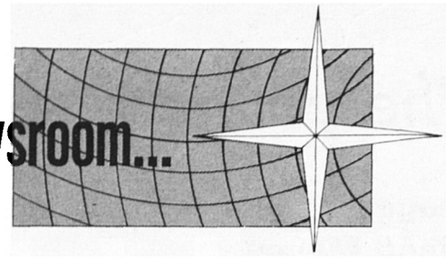
Please do not misunderstand me. I do not ask you to abandon those tasks which you are to undertake within the context of your family, your career, your country. I only ask you to remember, when carrying out these tasks, that you also belong to a larger family, a broader life and a vaster community, which is mankind. I ask you to realize that the meaning and value of your existence go beyond the immediate confines of your own personal destiny and that you are taking part in the same splendid adventure as the rest of mankind, an adventure which calls for understanding and effort from all. Lastly I ask you to regard every man you meet as a brother, that is, as your equal in dignity, with the same needs and the same hopes, regardless of his race, country, language, social status or beliefs.

You are growing up in a period of technological miracles. Your generation will reach the stars, but it is Man that I should like you, above all, to reach, to respect and cherish, in yourselves and in others.

May 1965 allow you to progress towards this goal through co-operation and concord, justice and peace!

Good luck to you, my friends! Be of good cheer and a Happy New Year to you!

From the Unesco Newsroom...



TO FIGHT ILLITERACY: The Shah of Iran has proposed to Unesco the organization of an international congress to explore the best ways of fighting illiteracy. In a message to Unesco's General Conference, the Shah congratulated Unesco on its efforts for world literacy and declared "it is the duty of every country and every chief of state to encourage and support these activities."

SEABORNE COSMIC RAY RESEARCH: Swedish freighters whose voyages take them to South African, Australian and Suez ports have been helping to collect important data on the influence of terrestial magnetism on cosmic radiation. Fitted with neutron monitors they have been collecting information for the past eight years to assist a programme of cosmic radiation research set up by the U.S. Bartol Research Foundation and the Cosmic Ray Group of the Uppsala Physicial Institute, Sweden.

GUIDEBOOKS FOR EDUCATORS: Two important publications designed as basic aids for educational planning have been published by the International Institute for Educational Planning in Paris, which was set up by Unesco in 1963. "Educational Planning: a Bibliography", covering several hundred documents, and "Educational Planning: a Directory of Training and Research Institutions" (covering 85 institutions in 30 countries) have appeared in English, and French versions will shortly appear. Both publications can be obtained from IIEP Publications, 7, rue Eugène-Delacroix, Paris-16e.

OPEN-AIR POWER STATION: One of the largest open-air power stations in the Soviet Union is now being built in Tashkent, Uzbekistan. The warm, dry Central Asian climate has allowed the designers to dispense with a large building to house the generating equipment, thus effecting considerable economy in time and money. The station, fueled by natural gas, will have a capacity of 1,200,000 kws.

THE ANGLER'S FRIEND: In many European countries otters have long been considered as the angler's enemies and have been hunted down to the point of extermination. But as the otters disappeared so did the fish. Scientists have now found that the otters had been taking mostly sick fish; when there were no otters to do this, disease spread rapidly among the fish population and numbers went down. Forewarned by the experience of other countries, Switzerland has now removed the otter from the list of so-called harmful animals and has given it federal protection.

INVESTMENT IN EDUCATION: Two missions have been sent by Unesco in co-operation with the World Bank to El Salvador and the Dominican Republic to study educational investment projects. These missions mark the start of direct co-operation between Unesco and the World Bank in helping countries to finance the costs of their educational development programmes. The missions will give priorities to actual or potential projects that are important for economic development in the two Latin American countries.

CENSORSHIP OF ARTS & IDEAS: Two new periodicals on censorship have just begun publication under the auspices of the Congress of Cultural Freedom. The first, published in Great Britain and priced 2/6, is entitled "Censorship" (1-2 Langham Place, London, W. 1). The second, published in France, is entitled "Censure contre les arts et la pensée" and costs 2 F. 50 (104, Bd. Haussmann, Paris 8e).

HONOURING GALILEO: An exhibition honouring Galileo and recalling the major events of his scientific career was held at Unesco's Paris H.Q. during the Unesco General Conference. Organized in collaboration with Unesco by the Italian National Committiee for the celebration of the 400th anniversary of Galileo's birth, it included among its exhibits reproductions of contemporary documents and replicas of instruments—spyglasses, a compass, telescopes and an astrolabe—whose originals are in the Museum of the History of Science at Florence.

AMERICAN READING HABITS: Is the American reader solely a product of "pop culture" (television, newspapers, and "bestseller" list pressures) or does he represent a real step forward toward universal literacy and creative thinking? This is one of the questions discussed in "The American Reading Public", a new book published by R. R. Bowker Co., 1180 Ave. of the Americas, New York (price, $7.95). The book takes a fresh look at reading methods taught in school, the quality of textbooks, the role of the modern public library and publishing and bookselling.

UNESCO SHAKESPEARE TRIBUTES: Special programmes to mark the 4th centenary of the birth of William Shakespeare were presented in Unesco's H.Q. in Paris during the Unesco General Conference. A distinguished group of authors, poets, critics, theatrical and film producers and directors collaborated in programmes relating Shakespeare to contemporary literature, the cinema and the modern theatre, including the presentation of scenes from the Bard's works. Round table discussions were held on different interpretations of Shakespeare's works and the problems of presenting them in terms of modern stage, screen and television production techniques.

ALL ABOUT THE U.N.: "Everyman's United Nations" presents the complete story of the U.N. family in a form that answers the needs of both specialist and casual reader. The latest edition (7th—Sales No. 64.1.9) constitutes a basic history of the U.N. from 1945 to 1963, describing its structure and purposes, the work it does and the intergovernmental agencies related to it. Published by the U.N. Office of Information, it is available from U.N. sales agents: Cloth edition, $5.00; paperback edition, $1.95. (598 pages).

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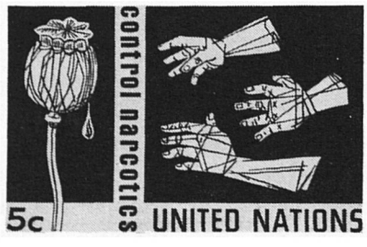

Flashes...

■ *Two new countries—Malawi and Zambia —joined Unesco during the recent Unesco General Conference, bringing the total membership to* 117 *states.*

■ *Puerto Rico spends more of its nationa income on education (*6.9%*) than any other country reports Unesco's Statistical Yearbook. Next to Puerto Rico come Finland (*6.6%*) and Japan and Czechoslovakia (*6.5% *each).*

■ *Two thousand schools are now taking part in Sweden's educational television programme. Some of the programmes are also re-televised in the evening for the benefit of parents.*

■ *Ultrasonic vibrations may become an alternative to sprays and poisons for pest control and may even be effective against pests that are resistant to common insecticides, according to two scientists at the University of Hawaii.*

■ *Deaths from cancer throughout the world increased from* 2,175,000 *in* 1950-52 *to* 2,623,000 *in* 1958-60*—an increase of about* 20 *%—reports WHO. Cancer is the second leading cause of death in the world after cardiovascular diseases.*

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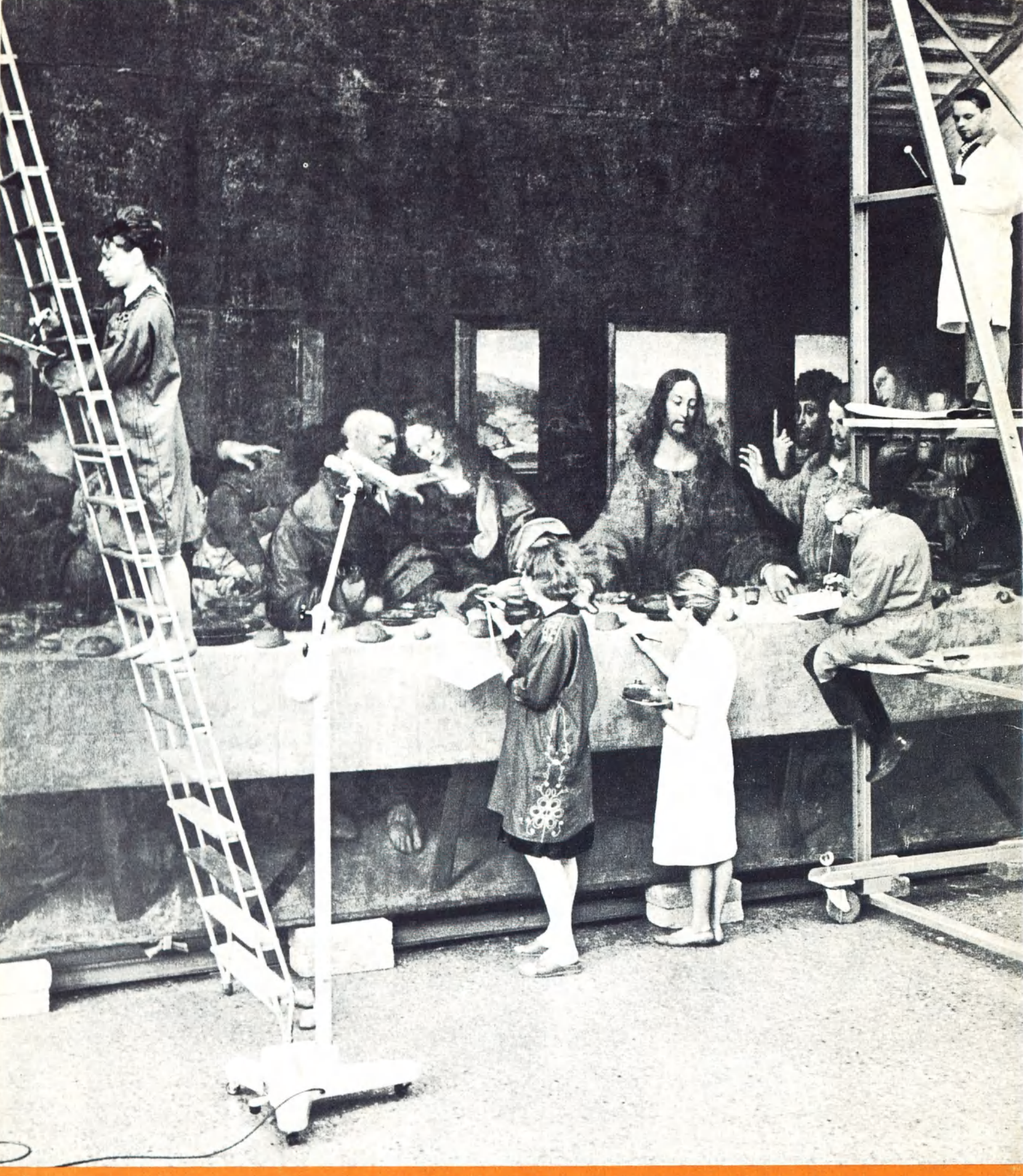

Penez © Paris-Match

'Last Supper' rejuvenated

One of the world's most celebrated works of art is Leonardo da Vinci's "Last Supper", painted on the refectory wall in the convent of Santa Maria delle Grazie, in Milan. Few people know about the existence of a remarkable copy of Leonardo's masterpiece made by one of his pupils, Andreas Solario. This giant canvas has suffered from well-meaning, but clumsy attempts at restoration in past centuries. It is seen here in the hands of art specialists at the Institut Royal de Patrimoine Artistique, in Brussels, who have already spent nearly five years delicately and meticulously removing the patching retouching and other traces of former "restorations" (see page 16).